## Contents

List of Illustrations ................................................. 9

List of Tables ......................................................... 13

Read This First ....................................................... 15

Part I: Learning about OMEGAMON II .................................. 21

### Chapter 1. Getting Started ........................................ 23
  - Overview .................................................. 24
  - Product Overview ........................................ 24
  - Approaches to Tuning the Network .......................... 25
  - VTAM and NCP Versions Supported ......................... 26
  - Standard User Interface .................................. 26
  - Function Keys ............................................ 27
  - Using the Action Bar ...................................... 28
  - Pull-down Menus .......................................... 29
  - Pop-up Windows ........................................... 30
  - Selection Methods ........................................ 31
  - Fastpath Methods ......................................... 32
  - Using Action Codes ....................................... 33
  - Panel Characteristics .................................... 34
  - Using Panel and Field Help ............................... 35
  - Using the Help Pull-down ................................. 36
  - Exception Recommendations .............................. 37
  - Customizing OMEGAMON II ............................... 38
  - Using the View Facility ................................... 45
  - Issuing OMEGAMON II Commands ......................... 47
  - Exceptions and Messages ................................ 48

### Chapter 2. Monitoring Network Performance ......................... 49
  - Overview .................................................. 50
  - Main Status Panel ......................................... 50
  - Navigation from Main Status Panel ....................... 51
  - Main Status Navigation .................................. 52
  - Status Lights ............................................. 53
  - Exception Displays ....................................... 55
  - Navigating by the Goto Pull-down ....................... 56
  - Response Times .......................................... 58
  - Using Trend Data ......................................... 58
Chapter 3. Saving and Retrieving Panels ........................................ 61
  Overview ................................................. 62
  Snapshot Storage ......................................... 62
  Saving a Panel Image ..................................... 63
  Retrieving a Panel Image by Description ................................. 64
  Using the Snapshot Directory .................................. 64
  Snapshot Panels .......................................... 66

Chapter 4. Using the VTAM Operator Console ................................. 71
  Overview ............................................... 72
  Issuing VTAM Commands .................................... 72

Chapter 5. Resource Analysis .................................................. 77
  Overview ............................................... 78
  Resource Types ......................................... 78
  Analyzing VTAM Resources .................................. 79
  Using the Goto Pull-down .................................. 80
  Resource Analysis for an Applid Panel ............................... 81
  Resource Analysis for a Terminal Panel ............................. 82
  Resource Analysis for a CDRSC Panel ............................. 83
  LUs in Session with a Resource Panel ............................. 84
  Session Analysis Panel .................................... 85
  Session Analysis Goto Pull-down ................................ 86
  Resource Analysis Feature Navigation .............................. 87

Part II: VTAM Tuning with OMEGAMON II .................................... 89

Chapter 6. Buffer Pool Analysis ................................................ 91
  Overview ............................................... 92
  Types of Buffer Pool Allocation ................................ 92
  Storage Usage ......................................... 93
  VTAM Buffer Pools ..................................... 94
  Tuning Buffer Pools with OMEGAMON II ............................ 97
  Case Study: Recognizing and Correcting Thrashing .............. 108
  Buffer Pools Component Navigation .............................. 114
  CRPL Buffer Pool Trending Navigation ........................... 115

Chapter 7. Virtual Routes ...................................................... 117
  Overview ............................................... 118
  Virtual Routes and Explicit Routes ............................... 118
  Virtual Route Pacing ..................................... 119
  How to Obtain Virtual Route Information .......................... 122
  How to Interpret Virtual Route Information ....................... 123
  How to Tune Virtual Routes ................................ 126
  Virtual Route Response Times ................................ 129
  Virtual Route Trends ..................................... 132
  Case Study: Blocked Virtual Route ................................ 137
  Historical Reports ....................................... 138
Part III: Setting OMEGAMON II VTAM Options for Your Site .......................... 307

Chapter 14. Monitoring Options .................................................. 309
- Overview ................................................................. 310
- Performance Objectives .............................................. 310
- Monitoring Options Pull-down .................................... 311
- Global Options ......................................................... 312
- Buffer Pool Options .................................................... 314
- Virtual Route Options ................................................. 317
- VTAM Environment Options ...................................... 321
- Response Time Options ............................................. 322
- NCP Performance Options ........................................ 325
- Tuning Statistics Options ......................................... 325
- Log File Utilization .................................................. 330
- TCP/IP Options ......................................................... 331
- Monitoring Options Navigation ................................. 336

Chapter 15. User Authorities ..................................................... 337
- Overview ................................................................. 338
- Access Levels .......................................................... 338
- User Authorities Startup ............................................ 339
- OMEGAVIEW Considerations ..................................... 339
- User Authorities Options ......................................... 340
- User Authorities Navigation ..................................... 345

Appendix A. Exceptions .......................................................... 347

Appendix B. OMEGAVIEW Zoom ............................................... 359
- Overview ................................................................. 360
- Zooming into OMEGAMON II .................................... 360
- Default Zoom Destinations ........................................ 362
- Alternate Zoom Destinations .................................... 363
- Usage ....................................................................... 364

Appendix C. Candle Customer Support ........................................ 367

Index ................................................................................. 371
List of Illustrations

1. Standard Set of Action Bar Choices ........................................ 28
2. Panel with Actions Pull-down Menu ....................................... 29
3. Panel with Pop-up Window .................................................... 30
4. Selecting More than One Item from a List ............................... 32
5. Selecting All Action Codes for Buffer Pools ............................ 33
6. Field-Level Help .................................................................. 35
7. Help Pull-down Menu ........................................................... 36
8. Exception Recommendation ..................................................... 37
9. Options Pull-down ............................................................... 38
10. Terminal Options Pop-up ........................................................ 39
11. Autorefresh Options Pop-up .................................................... 40
12. Autorefresh Indicator ............................................................ 40
13. Status Bar Options Pop-up ..................................................... 42
14. Network Manager Options Pop-up .......................................... 43
15. Printer Options Pop-up .......................................................... 44
16. View Pull-down Selections for VTAM Application Data ............. 45
17. View Some Pop-up with Selection Criteria ............................... 46
18. OMEGAMON II for VTAM Main Status Panel ......................... 50
19. All Exceptions Panel ........................................................... 55
20. OMEGAMON II for VTAM Main Status Panel with Goto Pull-down ................................................................. 57
21. Trend Display for Number of CRPL Buffer Pool Expansions .... 59
22. Enter a User Note .................................................................. 66
23. Duplicate Snapshot Description Pop-up ................................... 66
25. Snapshot Display Panel .......................................................... 68
26. Find Description Pop-up .......................................................... 69
27. VTAM Console Panel ............................................................. 72
28. VTAM Display Commands Pop-up .......................................... 74
29. VTAM Command Help ........................................................... 75
30. Resource Analysis Main Status Pop-up ................................... 80
31. Resource Analysis for an Applid .............................................. 81
32. Resource Analysis for Terminals ............................................. 82
33. Resource Analysis for a CDRSC ............................................. 83
34. LUs in Session with a Resource .............................................. 84
35. Session Analysis Panel ........................................................... 85
36. Session Analysis Goto Pull-down .......................................... 86
37. Resource Analysis Navigation ............................................... 87
38. VTAM Storage Utilization with Static vs. Dynamic Allocation .. 93
39. Buffer Pools Status Display .................................................. 98
40. CRPL Buffer Pool Start Options ........................................... 99
41. Buffer Pool Statistics Display ................................................ 100
42. Trend Display for Number of CRPL Buffer Pool Expansions ... 103
43. IO00 Usage by User Category ............................................... 104
44. IO00 Usage by Address Space .............................................. 105
45. IO00 Usage by Application ................................................... 106
<p>| 46. | Buffer Pool Extents for CRPL | 107 |
| 47. | Trend for Times Expanded for CRPL | 109 |
| 48. | CRPL Usage by Address Space | 110 |
| 49. | CRPL Buffer Pool Start Options | 111 |
| 50. | CRPL Usage Trending Display | 113 |
| 51. | Virtual Route Flow Control | 120 |
| 52. | Transmission Group Links with Different Capacities | 121 |
| 53. | Virtual Route Analysis Panel | 122 |
| 54. | Virtual Route Status Panel | 124 |
| 55. | Response Time Summary by Subarea | 129 |
| 56. | Response Time Summary by Virtual Route | 130 |
| 57. | Explicit Route Mapping Panel | 131 |
| 58. | Virtual Route Trending Selection Window | 132 |
| 59. | Virtual Route Status Trending | 133 |
| 60. | Virtual Route Window Size Trending | 134 |
| 61. | Virtual Route Message Traffic Trending | 135 |
| 62. | Virtual Route Session Distribution Trending | 136 |
| 63. | CTC Tuning Statistics Panel | 145 |
| 64. | CTC TNSTATS – List of CTCs | 149 |
| 65. | CTC TNSTATS Analysis Panel | 150 |
| 66. | MPC CTC Group TNSTATS Panel | 152 |
| 67. | MPC CTC Group TNSTATS Rate/Second | 152 |
| 68. | MPC CTC Group TNSTATS Analysis Panel | 153 |
| 69. | MPC CTC Group TNSTATS Analysis/Second | 153 |
| 70. | MPC CTC Subchannel TNSTATS | 154 |
| 71. | MPC CTC Subchannel TNSTATS Rate/Second | 154 |
| 72. | MPC CTC Subchannel TNSTATS Analysis | 155 |
| 73. | MPC CTC Subchannel TNSTATS Analysis/Second | 155 |
| 74. | CTC Analysis Trending of Individual SIO Reasons Panel | 157 |
| 75. | MPC CTC Subchannel TNSTATS Statistics Trending – Byte Count | 159 |
| 76. | NCP Tuning Statistics Panel | 165 |
| 77. | NCP Tuning Statistics Panel | 167 |
| 78. | NCP TNSTATS Analysis Panel | 168 |
| 79. | NCP Trending Panel | 170 |
| 80. | Local TNSTATS Panel | 175 |
| 81. | Local TNSTATS Analysis Panel | 176 |
| 82. | Calculating Response Time | 185 |
| 83. | Adding a Resource or Application to Monitor | 189 |
| 84. | Average Response Time Panel Showing NCP Resource Group Added | 191 |
| 85. | Average Response Time Panel Showing Individual LUs in Groups | 192 |
| 86. | Most Recent Response Time Panel Showing Sessions View | 194 |
| 87. | Response Time Summary by Subarea | 196 |
| 88. | Response Time Summary by Virtual Route | 197 |
| 89. | Terminal Response Time by Virtual Route and Transmission Priority | 198 |
| 90. | OMEGAMON II for VTAM Main Status Panel with VTAM Trace Status Light | 203 |
| 91. | VTAM Trace Facility Panel | 204 |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>92.</td>
<td>Add a Trace Pop-up</td>
</tr>
<tr>
<td>93.</td>
<td>Restart a Trace Pop-up</td>
</tr>
<tr>
<td>94.</td>
<td>Review a Trace Definition Pop-up</td>
</tr>
<tr>
<td>95.</td>
<td>Condensed PIU Entries Panel</td>
</tr>
<tr>
<td>96.</td>
<td>Display Trace Entries Panel</td>
</tr>
<tr>
<td>97.</td>
<td>TH Trace Analysis Panel</td>
</tr>
<tr>
<td>98.</td>
<td>RH Trace Analysis Panel</td>
</tr>
<tr>
<td>99.</td>
<td>RU Trace Analysis Panel</td>
</tr>
<tr>
<td>100.</td>
<td>Data Stream Analysis Panel</td>
</tr>
<tr>
<td>101.</td>
<td>Print Trace Report Pop-up Panel</td>
</tr>
<tr>
<td>102.</td>
<td>VTAM Environmental Summary Display</td>
</tr>
<tr>
<td>103.</td>
<td>VTAM Environmental Data</td>
</tr>
<tr>
<td>104.</td>
<td>VTAM CSA Performance</td>
</tr>
<tr>
<td>105.</td>
<td>VTAM Paging Performance</td>
</tr>
<tr>
<td>106.</td>
<td>VTAM I/O Distribution</td>
</tr>
<tr>
<td>107.</td>
<td>VTAM I/O Rates</td>
</tr>
<tr>
<td>108.</td>
<td>VTAM CPU Utilization</td>
</tr>
<tr>
<td>109.</td>
<td>VTAM Internal Trace Statistics</td>
</tr>
<tr>
<td>110.</td>
<td>VTAM Internal Trace Data</td>
</tr>
<tr>
<td>111.</td>
<td>VTAM User Exits (VTAM 4.3)</td>
</tr>
<tr>
<td>112.</td>
<td>Symbol Resolution Table (SRT) Analysis Panel</td>
</tr>
<tr>
<td>113.</td>
<td>VTAM SRT Analysis Panel with Model Values</td>
</tr>
<tr>
<td>114.</td>
<td>SRT Frequency Distribution Panel</td>
</tr>
<tr>
<td>115.</td>
<td>Currently Acquired VTAM Locks</td>
</tr>
<tr>
<td>116.</td>
<td>Waiting for a Lock</td>
</tr>
<tr>
<td>117.</td>
<td>Dump Display of the PAB-containing Control Block</td>
</tr>
<tr>
<td>118.</td>
<td>Dump Display of PAB at a Lock Analysis Time</td>
</tr>
<tr>
<td>119.</td>
<td>Dump Display of the Control Block Containing the Lockword</td>
</tr>
<tr>
<td>120.</td>
<td>Dump Display of the Lockword at a Lock Analysis Time</td>
</tr>
<tr>
<td>121.</td>
<td>Dump Display of Storage at Resume Address</td>
</tr>
<tr>
<td>122.</td>
<td>VTAM Constants Display (VTAM releases prior to 4.2)</td>
</tr>
<tr>
<td>123.</td>
<td>TCP/IP Status Summary</td>
</tr>
<tr>
<td>124.</td>
<td>TCP/IP Buffer Pools Panel</td>
</tr>
<tr>
<td>125.</td>
<td>TCP/IP Connection Selection</td>
</tr>
<tr>
<td>126.</td>
<td>All Connections for an Address Space</td>
</tr>
<tr>
<td>127.</td>
<td>Application Status Panel</td>
</tr>
<tr>
<td>128.</td>
<td>Device Status Panel</td>
</tr>
<tr>
<td>129.</td>
<td>Gateway Status Panel</td>
</tr>
<tr>
<td>130.</td>
<td>Configuration Information Panel</td>
</tr>
<tr>
<td>131.</td>
<td>Address Space, Applids, and Terminals</td>
</tr>
<tr>
<td>132.</td>
<td>Applications by Address Space</td>
</tr>
<tr>
<td>133.</td>
<td>Address Space Analysis for VTAM Application Panel</td>
</tr>
<tr>
<td>134.</td>
<td>Applications by APPLID</td>
</tr>
<tr>
<td>135.</td>
<td>APPLIDs in Address Space Panel</td>
</tr>
<tr>
<td>136.</td>
<td>Analysis of APPLID Display</td>
</tr>
<tr>
<td>137.</td>
<td>LUs in Session with APPLID Panel</td>
</tr>
<tr>
<td>138.</td>
<td>Session Information for APPLID Panel</td>
</tr>
<tr>
<td>139.</td>
<td>SIB Data for LU Panel</td>
</tr>
<tr>
<td>140.</td>
<td>COSTAB Panel</td>
</tr>
<tr>
<td>141.</td>
<td>VTAM Control Blocks for APPLID</td>
</tr>
<tr>
<td>142. ACB Data for Applid Panel</td>
<td>298</td>
</tr>
<tr>
<td>143. VTAM Exits for APPLID</td>
<td>300</td>
</tr>
<tr>
<td>144. VTAM Definition Data for APPLID</td>
<td>301</td>
</tr>
<tr>
<td>145. Case Study: APPLIDs in Address Space</td>
<td>303</td>
</tr>
<tr>
<td>146. Case Study: Using the Analysis of APPLID Panel</td>
<td>304</td>
</tr>
<tr>
<td>147. Monitoring Options Menu</td>
<td>312</td>
</tr>
<tr>
<td>148. Global Options Panel</td>
<td>312</td>
</tr>
<tr>
<td>149. Buffer Pool Options Panel</td>
<td>314</td>
</tr>
<tr>
<td>150. Buffer Pool Monitor Options Pop-up</td>
<td>315</td>
</tr>
<tr>
<td>151. Buffer Pool Thresholds (except CRPL) Pop-up</td>
<td>316</td>
</tr>
<tr>
<td>152. Buffer Pool Thresholds for CRPL Pop-up</td>
<td>316</td>
</tr>
<tr>
<td>153. Virtual Route Monitor Options Pop-up</td>
<td>317</td>
</tr>
<tr>
<td>154. VR Monitor List Panel</td>
<td>319</td>
</tr>
<tr>
<td>155. VR Monitor List Showing All Virtual Routes</td>
<td>321</td>
</tr>
<tr>
<td>156. VTAM Environment Thresholds Panel</td>
<td>321</td>
</tr>
<tr>
<td>157. Response Time Monitor Options</td>
<td>322</td>
</tr>
<tr>
<td>158. Response Time SMF Options</td>
<td>323</td>
</tr>
<tr>
<td>159. SMF Response Time Pop-up for Adding a Resource</td>
<td>324</td>
</tr>
<tr>
<td>160. TNSTATS NCP Options Pop-up</td>
<td>327</td>
</tr>
<tr>
<td>161. TNSTATS CTC Options</td>
<td>328</td>
</tr>
<tr>
<td>162. TNSTATS LOCAL Options Pop-up</td>
<td>329</td>
</tr>
<tr>
<td>163. Log File Utilization Panel</td>
<td>330</td>
</tr>
<tr>
<td>164. TCP/IP Default Monitoring Options Menu</td>
<td>331</td>
</tr>
<tr>
<td>165. TCP/IP Address Space Monitoring Options</td>
<td>332</td>
</tr>
<tr>
<td>166. TCP/IP 3.2 Buffer Pool Exceptions</td>
<td>333</td>
</tr>
<tr>
<td>167. TCP/IP Connection Exceptions</td>
<td>334</td>
</tr>
<tr>
<td>168. TCP/IP Application Exceptions</td>
<td>335</td>
</tr>
<tr>
<td>169. TCP/IP Device Exceptions</td>
<td>335</td>
</tr>
<tr>
<td>170. Users Authorities Display Panel</td>
<td>340</td>
</tr>
<tr>
<td>171. Add User Authorities Panel</td>
<td>341</td>
</tr>
<tr>
<td>172. Change User Authorities Panel</td>
<td>343</td>
</tr>
<tr>
<td>173. Delete User Authorities Panel</td>
<td>344</td>
</tr>
<tr>
<td>174. OMEGAVIEW to OMEGAMON II for VTAM Zoom Overview</td>
<td>361</td>
</tr>
</tbody>
</table>
List of Tables

1. OMEGAMON II for VTAM Documentation .......................... 20
Preface

About this document

This manual explains how to use OMEGAMON II® for VTAM (hereafter referred to as OMEGAMON II) to monitor your network and tune VTAM, your NCPs, and the lines, PUs, and LUs connected to them. It is intended for several audiences:

- If you are new to OMEGAMON II, you can start by reading “Getting Started” on page 23 for an introduction to the CUA interface and then “Monitoring Network Performance” on page 49 for an overview of how OMEGAMON II monitors your network’s performance (Part I).

- If you are familiar with OMEGAMON II, you can go directly to “Buffer Pool Analysis” on page 91 (Part II).

- For performance monitoring and tuning of your NCP resources, please see the OMEGAMON II for VTAM NCP Monitoring Guide.

- If you are responsible for administrating the product, you can refer to “Monitoring Options” on page 309 and “User Authorities” on page 337 (Part III).

The tuning techniques described in this document are based on the recommendations of two IBM publications: VTAM Customization and VTAM Performance and Tuning, a technical bulletin.

Version 500 of OMEGAMON II contains several new features and enhancements. Please see the OMEGAMON II for VTAM Version 500 Release Guide for a brief description of each feature.

If you are interested in historical reporting or SMF record layouts, please refer to the OMEGAMON II for VTAM Historical Reporting Guide.
**Adobe Portable Document Format**

**Introduction**

Candle supplies documentation in the Adobe Portable Document Format (PDF). The Adobe Acrobat Reader prints PDF documents with the fonts, formatting, and graphics in the original document. To print a Candle document, do the following:

1. Specify the print options for your system. From the Acrobat Reader Menu bar, select **File > Print Setup...** and make your selections. A setting of 300 dpi is highly recommended as is duplex printing if your printer supports it.

2. To start printing, select **File > Print** on the Acrobat Reader Menu bar.

3. On the Print popup, select one of the **Print Range** options for
   - a single page
   - a range of pages
   - all of the document

4. (Optional) To fit oversize pages to the paper size currently loaded on your printer, select the **Shrink to Fit** option.

**Printing problems?**

Your printer ultimately determines the print quality of your output. Sometimes printing problems can occur. If you experience printing problems, potential areas to check are:

- settings for your printer and printer driver. (The dpi settings for both your driver and printer should be the same. A setting of 300 dpi is recommended.)

- the printer driver you are using. (You may need a different printer driver or the Universal Printer driver from Adobe. This free printer driver is available at www.adobe.com.)

- the halftone/graphics color adjustment for printing color on black and white printers. (Check the printer properties under **Start > Settings > Printer**. For more information, see the online help for the Acrobat Reader.)

- the amount of available memory in your printer. (Insufficient memory can cause a document or graphics to fail to print.)

For additional information on printing problems, refer to the documentation for your printer or contact your printer manufacturer.
Documentation Conventions

Introduction

Candle documentation adheres to accepted typographical conventions for command syntax. Conventions specific to Candle documentation are discussed in the following sections.

Panels and figures

The panels and figures in this document are representations. Actual product panels may differ.

Revision bars

Revision bars (|) may appear in the left margin to identify new or updated material.

Variables and literals

In examples of command syntax, uppercase letters are actual values (literals) that the user should type; lowercase letters are used for variables that represent data supplied by the user. Default values are underscored.

LOGON APPLID(cccccccc)

In the above example, you type LOGON APPLID followed by an application identifier (represented by cccccccc) within parentheses. The number of characters indicates the maximum allowable length of the variable.

Note: In ordinary text, variable names appear in italics.
Symbols

The following symbols may appear in command syntax.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Usage</th>
</tr>
</thead>
</table>
| \( | \) | The 'or' symbol is used to denote a choice. Either the argument on the left or the argument on the right may be used. Example: \[
\text{YES | NO}
\]
In this example, YES or NO may be specified. |
| \[ \] | Denotes optional arguments. Those arguments not enclosed in square brackets are required. Example: \[
\text{APPLDEST DEST [ALTDEST]}
\]
In this example, DEST is a required argument and ALTDEST is optional. |
| \{ \} | Some documents use braces to denote required arguments, or to group arguments for clarity. Example: \[
\text{COMPARE \{workload\} - REPORT=\{SUMMARY | HISTOGRAM\}}
\]
The workload variable is required. The REPORT keyword must be specified with a value of SUMMARY or HISTOGRAM. |
| _ \_ | Default values are underscored. Example: \[
\text{COPY infile outfile - [COMPRESS=\{YES | NO\}}
\]
In this example, the COMPRESS keyword is optional. If specified, the only valid values are YES or NO. If omitted, the default is YES. |
| \b \b | The symbol b indicates a blank space, when needed for clarity. |


**Documentation Set**

**Introduction**

Candle provides a complete set of documentation for OMEGAMON II for VTAM. Each manual in this documentation set contains a specific type of information to help you use the product.

Candle welcomes your comments and suggestions for changes or additions to the documentation set. A user comment form, located at the back of each manual, provides simple instructions for communicating with Candle's Information Development department. You can also send email to UserDoc@candle.com. Please include the product name, version, and book title in the subject line. To order additional manuals, contact Candle Customer Support.

**Online documentation**

The following documents in the OMEGAMON II for VTAM Version 500 documentation set are available online in BookManager® format:

- OMEGAMON II for VTAM Version 500 Release Guide
- OMEGAMON II for VTAM Configuration and Customization Guide
- OMEGAMON II for VTAM User's Guide
- OMEGAMON II for VTAM NCP Monitoring Guide
- OMEGAMON II for VTAM Historical Reporting Guide
- OMEGAMON II for VTAM Messages Manual
- End-to-End Response Time Feature (ETE) Reference Manual

**Printed documentation**

The documentation listed in the following table is available for OMEGAMON II for VTAM. To order additional product manuals, contact your Candle Customer Support representative.
### Table 1. OMEGAMON II for VTAM Documentation

<table>
<thead>
<tr>
<th>Document Number</th>
<th>Document Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON60-5384</td>
<td>OMEGAMON II for VTAM Version 500 Release Guide</td>
<td>Lists new features, enhancements, and changes for this release.</td>
</tr>
<tr>
<td>IC51-5811</td>
<td>Installing Candle Products on MVS</td>
<td>Provides instructions for installing OMEGAMON II</td>
</tr>
<tr>
<td>ON51-5385</td>
<td>OMEGAMON II for VTAM Configuration and Customization Guide</td>
<td>Shows how to configure, verify, and customize OMEGAMON II for VTAM to your site's requirements.</td>
</tr>
<tr>
<td>ON54-5386</td>
<td>OMEGAMON II for VTAM User's Guide</td>
<td>Shows how to use OMEGAMON II for VTAM to monitor and tune your network.</td>
</tr>
<tr>
<td>ON99-5389</td>
<td>OMEGAMON II for VTAM NCP Monitoring Guide</td>
<td>Shows how to use OMEGAMON II for VTAM to monitor and tune your NCP resources.</td>
</tr>
<tr>
<td>ON54-5387</td>
<td>OMEGAMON II for VTAM Historical Reporting Guide</td>
<td>Shows how to produce reports and graphs from SMF records generated by OMEGAMON II and provides record layouts.</td>
</tr>
<tr>
<td>ON52-5388</td>
<td>OMEGAMON II for VTAM Messages Manual</td>
<td>Lists messages issued, their explanations, and suggested responses.</td>
</tr>
<tr>
<td>ET53-5586</td>
<td>End-to-End Response Time Feature (ETE) Reference Manual</td>
<td>Describes ETE and its commands, and lists error messages, return codes, and sense codes.</td>
</tr>
</tbody>
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20 OMEGAMON II for VTAM User's Guide Version 500
# Part I: Learning about OMEGAMON II

Chapter 1. Getting Started ........................................... 23

Chapter 2. Monitoring Network Performance .................. 49

Chapter 3. Saving and Retrieving Panels ....................... 61

Chapter 4. Using the VTAM Operator Console ............... 71

Chapter 5. Resource Analysis ........................................ 77
Overview

This chapter introduces you to OMEGAMON II and to network tuning techniques. It summarizes the features of OMEGAMON II, explains approaches to tuning VTAM, and tells you how to navigate through OMEGAMON II's panels and use its interface most effectively.

Product Overview

OMEGAMON II gives you the tools to monitor and tune VTAM and the NCPs, lines, PUs, and LUs in your network. VTAM, which is started as an MVS subsystem in the host, consumes large amounts of host resources when the network is loaded. OMEGAMON II helps you analyze how VTAM is running. You can use OMEGAMON II's information in planning how to achieve and maintain network performance and availability levels.

Why Monitor VTAM?

Corporate computing needs place an increasingly heavy load on the network as LANs and distributed computing applications are added. Because the network has one of the highest availability requirements of all data center resources, it needs to be well tuned.

When network problems such as poor response time occur, most analysis tools look at front-end processor traces and queue lengths. In reality, VTAM slowdowns can cause those same response time symptoms. Often, it can be difficult to determine whether the problem originates in VTAM or elsewhere.

What OMEGAMON II Does

OMEGAMON II helps you determine whether short-term network problems are due to VTAM, and also provides information that can help you plan a more efficient long-term network design and configuration.

OMEGAMON II guides you through the process of tuning VTAM and its communication with channel- and link-attached devices. These tuning techniques are based on the recommendations of two IBM documents: VTAM Customization and VTAM Performance and Tuning.

Because terminal response time is so closely related to network performance, OMEGAMON II includes an entire facility to monitor response time for terminals in session with host applications. OMEGAMON II also includes a
VTAM operator console interface and an interface with NetView or SOLVE:Netmaster.

OMEGAMON II gives you quick access to all its information through an easy-to-use SAA (Systems Application Architecture/Common User Access) interface. You can get online help for every facility, every panel, and input and output fields.

You can access the OMEGAMON II application directly through its own logon panel or through Candle's CL/SUPERSESSION®, CL/GATEWAY®, CL/CONFERENCE®, or OMEGAVIEW®.

Detecting NCP Resource Problems

Many large networks include NCPs to offload network management from the host. The OMEGAMON II NCP performance component enables you to tune your NCPs and also the SDLC and BSC lines, token-ring connections, PUs, and LUs connected to them. These are some of the problems that can degrade the performance of your network. OMEGAMON II can help you to detect them.

- NCP cycle shortage
- NCP storage shortage
- insufficient bandwidth
- high polling delays
- error retransmissions
- TIC congestion

Approaches to Tuning the Network

The basic objective of tuning your network is to avoid congestion by balancing the network's load among its resources. Network tuning generally involves compromises between actions that improve storage efficiency but increase the load on the processor, and actions that reduce the load on the processor but use more storage.

To improve storage efficiency, you can tune VTAM’s buffer pools and control fluctuations in storage requirements. To reduce the load on the processor, you can minimize input/output interrupts and reduce the network overhead (for example, by preventing thrashing, which is a state of constant expansion and contraction of a buffer pool).

At your request, VTAM can supply tuning statistics for channel-to-channel adaptors (CTCs), network control programs (NCPs), and locally attached system network architecture (SNA) devices. VTAM attempts to schedule I/O to these devices in a way that reduces host overhead. By analyzing the tuning
statistics, OMEGAMON II calculates the amount of host overhead. For example, the tuning statistics may show that an NCP is interrupting the host too often. You can then make changes to VTAMLST to improve this condition.

Tuning VTAM to improve terminal response time requires a different technique. If OMEGAMON II finds that the majority of the terminal's response time is due to network delays outside VTAM, then changes to VTAM may not solve the problem. You need to examine response time to the terminal's subarea and along the network routes. Changing the session's virtual route or redistributing traffic through the class-of-service table may be the correct solution.

There are additional VTAM parameters monitored by OMEGAMON II, such as virtual route window size, that you can tune to improve network performance. The chapters that follow explain how you can tune VTAM by using the various kinds of information that OMEGAMON II provides. The rest of this chapter tells how to use OMEGAMON II's panels and navigation paths to access that information.

### VTAM and NCP Versions Supported

OMEGAMON II supports the following releases:

- VTAM Versions 3.3 and above
- NCP Versions 4.3 and above

Earlier releases are not supported.

### Standard User Interface

OMEGAMON II applies IBM's SAA/CUA standards to the user interface. SAA/CUA is a set of guidelines for how display panels should look and feel to display terminal users. IBM introduced CUA to encourage ease of use and consistency among software products developed for PCs, minicomputers, and mainframes. The following sections illustrate how these standards apply to OMEGAMON II.
Many of the tasks you perform with OMEGAMON II use the function keys, or F keys. These keys and their corresponding functions display at the bottom of each panel. For ease of use, function key assignments for all OMEGAMON II windows and menus are standardized. For example, pressing F1 at any OMEGAMON II panel causes a pop-up help window to appear, and pressing F5 refreshes the panel.

You will find that not all function key selections are available for every OMEGAMON II panel. Keys not relevant to the current panel are omitted. For example, panels with data that may continue over several panels display the backward and forward function keys, F7 and F8. Panels that don't require scrolling do not display these keys.

The following function key values are generally available throughout OMEGAMON II, although in some components they differ. The global function key selections are:

**F1 Help**
Display help window for the current panel or field.

**F2 Keys**
Toggle display of the function keys. From field help, display panel help. From panel help, display general help.

**F3 Exit**
Exit the current panel, keeping all changes and additions made in any of the fields.

**F4 Prompt**
Toggle through or display a list of valid input selections for a field. A plus (+) sign after an input field indicates that it is promptable.

**F5 Refresh**
Clear and update the panel.

**F6 Console**
Replace the current panel with the VTAM operator console. Upon exit from the console, the previous panel returns.

**F7 Bkwd**
Scroll backward if more lines exist than can be displayed on the current panel.

**F8 Fwd**
Scroll forward if more lines exist than can be displayed on the current panel.

**F9 Retrieve**
Retrieve the last command issued and redisplay it on the command line. Press F9 repeatedly to retrieve up to 10 commands.
F10 Action bar   Move the cursor to the action bar entry field.

F11 Print   Capture the current OMEGAMON II panel for later printing.

F12 Cancel   Cancel the current panel, and erase any changes since you last pressed Enter. If you select several OMEGAMON II displays from a list with slash (/), then F12 displays the next panel in the sequence.

F14 Find   Move the cursor directly to a specified display entry.

F15 Status Display   Return to the OMEGAMON II main status panel.

F17 Clear counts   Clear and reset counts on response time panels.

Using the Action Bar

The action bar is the menu line at the top of the panel (the first line of Figure 1). You use it to make selections from pull-down menus, take shortcuts to other panels, and get help.

OMEGAMON II provides a standard set of action bar keyword choices. Some displays, such as the one shown below, contain the entire set, while others contain a subset of these choices.

--- Actions Goto View Options Help
-----------------------------------------------------------------------------------------------
KONDAIDD APPLIDs in Address Space $BDAPER A

Select with a "/" or an action code. Lines 1 to 7 of 7
S=Sessions A=Analysis C=Control blocks E=Exits V=VTAM definition

<table>
<thead>
<tr>
<th>Applid</th>
<th>State</th>
<th>Status</th>
<th>ACBNAME</th>
<th>Active</th>
<th>Pending</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDAPA101</td>
<td>ACTIVE</td>
<td>READY</td>
<td>BDAPA101</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>BDAPA102</td>
<td>ACTIVE</td>
<td>READY</td>
<td>BDAPA102</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>BDAPA103</td>
<td>ACTIVE</td>
<td>READY</td>
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<td>0</td>
</tr>
<tr>
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<td>READY</td>
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<tr>
<td>BDAPA106</td>
<td>ACTIVE</td>
<td>READY</td>
<td>BDAPA106</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>BDAPA107</td>
<td>ACTIVE</td>
<td>READY</td>
<td>BDAPA107</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>COMITS1A</td>
<td>ACTIVE</td>
<td>READY</td>
<td>COMITS1A</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Command ===>
F1=Help  F2=Keys  F3=Exit  F5=Refresh  F6=Console  **=bkwd  **=Fwd  F9=Retrieve
F10=Action Bar  F11=Print  F12=Cancel  F15=Status Display

Figure 1. Standard Set of Action Bar Choices
The standard action bar choices are:

**Actions**  Access the action codes applicable to the current panel.

**Goto**  Navigate to different OMEGAMON II displays.

**View**  Filter or sort the displayed data (see “Using the View Facility” on page 45).

**Options**  Customize OMEGAMON II.

**Help**  Access the various types of help available for OMEGAMON II (see “Using the Help Pull-down” on page 36).

To use the action bar, press F10 or the Home key to place the cursor in the action bar entry field. Enter the mnemonic for the action bar choice, which is the first letter of the choice.

---

**Pull-down Menus**

When you select a keyword choice from the action bar, OMEGAMON II displays a pull-down menu. A pull-down provides a list of further selections that you can make. The following figure shows a typical OMEGAMON II panel after **Actions** has been selected from the action bar.

---

Figure 2. Panel with Actions Pull-down Menu
Although part of the underlying panel is visible, its selections and entry fields are unavailable. If you move the cursor outside the pull-down area and press a key, the cursor returns to the pull-down.

Pop-up Windows

Pop-up windows, as shown in the following figure, are small panels that are superimposed over the base panel. You invoke a pop-up by choosing a selection from a pull-down or by entering an action code. Pop-ups may prompt for further selections, provide alerts for possible error conditions, or display help or security information. Pop-ups can overlap each other, but you cannot use an underlying panel or window while a pop-up displays.

Figure 3. Panel with Pop-up Window
Selection Methods

OMEGAMON II provides several techniques for selecting items from panels, pull-downs, and pop-ups. The Exit Verification pop-up in Figure 3 on page 30 shows one set of techniques. On that pop-up, you can make a selection by any of the following methods:

- Enter the number of the desired selection.
- Enter the letter, or mnemonic, that represents the desired selection.
- Position the cursor to the left of the desired selection and press Enter.

These methods are available whenever you can select one and only one item from a list.

A different selection technique is available for selecting more than one item from a list. This involves typing a slash (/), to the left of each desired selection, and then pressing Enter. After the first selection displays, you use F12 to cycle through the rest of the selected displays.

For example, as shown in the following figure, when you select the Actions pull-down from the Buffer Pool Status Display, then select Exceptions, Statistics, and Start Options by typing a slash (/) next to each one, and then press Enter, OMEGAMON II displays the Buffer Pool Exceptions Display first. When you press F12 to cancel the Exceptions panel, the Buffer Pools Statistics Display appears. Similarly, the next time you press F12, the Buffer Pool Start Options Display appears. When you press F12 again, you return to the Buffer Pool Status Display, which is the underlying panel.
Fastpath Methods

As an alternative, CUA provides fastpath methods for selecting pull-down menus and pop-up windows. For example, when selecting a pull-down, you can enter its letter code in the first field of the action bar (the input field to the left of the entire action bar).

As a further shortcut, you can enter the mnemonics that represent your choices for several levels of submenus at once. The OMEGAMON II limit is three levels of mnemonics.

These are some examples of fastpaths.

- To select Exceptions from the Goto pull-down and bypass the pull-down entirely, enter GX in the action bar entry field.
- To select Global Options from the Options pull-down and bypass the pull-down and its submenu, enter OMO in the action bar entry field.
Using Action Codes

You can use action codes to select panels without choosing them from the Actions pull-down. You tab to the selection you want on the panel and enter the action code. All available action codes display just above the data portion of each panel. Thus, entering X next to Buffer Pools displays buffer pool exceptions; entering S shows buffer pool details.

To choose all action codes for a selection:

1. Enter a plus sign (+) next to a display selection.
2. Press F12 once for each action, to cycle through all available actions.

![Actions](image)

**Figure 5. Selecting All Action Codes for Buffer Pools**

This panel shows how to use the plus sign to select all action codes for the **Buffer Pools** selection on the main status panel. In this example, when you press Enter, you first see the Buffer Pool Exceptions panel (X action code). Then when you press F12, the Buffer Pools Status Display appears (S action code).
Panel Characteristics

The CUA-compliant conventions that OMEGAMON II panels follow are:

Attributes
Color, highlighting, and underlining, as well as certain characters, identify types of text and fields. On a monochrome terminal, high intensity emphasizes fields. On a color terminal, yellow emphasizes fields. On some terminal types (such as 3290s), reverse video emphasizes fields.

Selection items
On color terminals, white or blue text represents a selectable field. White indicates the field is available for selection; blue indicates the field is unavailable.

Fields
Entry fields are underlined or highlighted. When a plus sign (+) follows an entry field, it is promptable. Asterisks (*) appear in output fields when information is unavailable.

Actions
Actions selected from a menu take place immediately after you make the selection. However, when an ellipsis, or three dots, follows a menu selection, further information is required. You must choose from another submenu or add data in a pop-up window to complete the task.

Continuation notifiers
If more than one window of information is required to complete a list, menu, or task, the word More appears near the upper right corner of the panel. Next to the word is either a + or a -. If + appears, press F8 to see the next panel. If - appears, press F7 to see the previous panel.

Empty panels
If a panel displays for which there is no data, the data fields contain asterisks. For example, if VTAM has no local terminals attached, the Local TNSTATS panels show asterisks in all the data fields.
OMEGAMON II provides help for every panel. To obtain help for the panel as a whole, position the cursor anywhere in the panel that is not an entry or display field and press F1 (Help). A help window displays information about that panel.

There is also context-sensitive help for many of the fields on each panel. To get help for a particular field (including output or read-only fields), move the cursor into the field and press F1. A help window displays information about that field as shown in the following figure.

Panel and field-level helps are more technically comprehensive and more detailed than the descriptions found in this document. To remind you that more technical information is available you will see this help icon throughout this document.

After you select field help, you can get extended help by pressing F2. Extended help provides additional information about the current panel as a whole. When you have finished viewing help, press F12 to return to the previous panel.
Using the Help Pull-down

You can select general help from any OMEGAMON II panel. Position the cursor next to the Help action bar choice and press Enter. A pull-down menu lists the types of help available as in the following figure.

To select a particular type of help, position the cursor to the left of the selection and press Enter.

The Help pull-down includes five selections:

**Help for help** tells how to navigate through the help panels.

**Extended help** describes the current panel as a whole.

**Keys help** describes the function keys, as well as any other special purpose keys.

**Tutorial** contains instructions and techniques for using the CUA interface.

**About** shows logo, copyright, and product version information.
Exception Recommendations

On Exceptions displays, OMEGAMON II provides action code S (Show recommendations). If you enter S next to a selected exception, you can view an explanation of the exception and its implications, recommendations for how to improve the condition, background information, and how to modify thresholds. The following figure shows an example of an exception recommendation.

---

**Figure 8. Exception Recommendation**

---
Customizing OMEGAMON II

Enter 0 (for Options) in the action bar entry field to customize various aspects of OMEGAMON II. The Options pull-down appears.

The Options pull-down selections fall into the following categories:

**User defaults**
Use to customize your OMEGAMON II user interface, NetView or Netmaster access, and data refresh interval.

**Historical graphs**
Use to setup display and print of color historical graphs. See the information about SAS reporting in the *OMEGAMON II for VTAM Historical Reporting Guide*.

**Administrator functions**
System administrators use these to set exception thresholds and levels of OMEGAMON II access. Those without administrator authority may browse these settings. See “Monitoring Options” on page 309 and “User Authorities” on page 337.

**Print functions**
Use to specify printer options and print selected OMEGAMON II panels or VTAM traces.
**Terminal Options**

Select **Terminal Options** to modify OMEGAMON II panel characteristics. The default setting is **Yes** for all options. Press F4 (Prompt) to toggle the setting to **No**.

```
+----------------------------------------------+
| KONDOTOD Terminal Options                   |
| Type terminal options and press Enter.      |
| Panel ids. . . . . . . Yes + (Yes/No)        |
| Message ids. . . . . Yes + (Yes/No)          |
| Message beep . . . . Yes + (Yes/No)          |
| Action code instructions Yes + (Yes/No)      |
| Date and time. . . . Yes + (Yes/No)          |
| Display function keys. . Yes + (Yes/No)      |
| Implicit action. . . Yes + (Yes/No)          |
|                                             |
| F1=Help F4=Prompt F12=Cancel                |
+----------------------------------------------+
```

**Figure 10. Terminal Options Pop-up**

**Option**  

**Default (Yes):**

- **Panel IDs**
  Display the panel name.

- **Message IDs**
  Display the message text with the message number.

- **Message beep**
  Accompany warning and critical messages with a beep.

- **Action code instructions**
  Display a reminder line that shows the valid action choices.

- **Date and time**
  Display the date and time.

- **Display function keys**
  Display function key settings at bottom of panel.

- **Implicit action**
  When the cursor is in an action entry field, use the default action code when you press Enter. The default action code is always the first one listed.
**Autorefresh Options**

Select **Autorefresh Options** to refresh some OMEGAMON II panels (for example, the response time panels) automatically, rather than manually with the F5 key. Use this panel to activate autorefresh and specify the refresh interval.

![Figure 11. Autorefresh Options Pop-up](image)

If you set both the autorefresh and one or more of the main status beep options, you will know when VTAM exceptions are occurring without having to watch the terminal. The beep alerts you when any status light on the main status panel indicates a warning or critical condition. (See “Terminal Beep Option” on page 42.)

When you activate autorefresh, **AUTO** and the interval in seconds appears at the upper-right of any display that supports autorefresh. The following panel shows 60 seconds.

![Figure 12. Autorefresh Indicator](image)
Status Bar Options

Many OMEGAMON II panels display status lights that indicate the health of different parts of VTAM and the network. Based on thresholds set by the OMEGAMON II administrator, the status lights tell you whether an area is normal (green), may have a problem (yellow), or is in critical condition (red). A turquoise light may indicate that the monitor for that area is idle, response time monitoring is disabled, or the response time module is an incompatible version.

If you have a monochrome monitor or if you have impaired color vision, the text printed in the status light area tells you the current status. The default status text is:

Normal If status light is green.
Warning If status light is yellow.
Critical If status light is red.
Idle If status light is turquoise.

Note: The VTAM Trace status light is unlike the others and displays as follows:

Green If one or more traces is running.
Yellow If traces have completed.
Red If traces have ended abnormally.
Turquoise If no traces are active.

To change the text that appears in the status light area, select Status Bar Options from the Options pull-down. Modify the text for any status type.

For more information on the status lights, see “Monitoring Network Performance” on page 49. For information on setting thresholds, see “Monitoring Options” on page 309.
Figure 13. Status Bar Options Pop-up

Terminal Beep Option

The nine fields indented below VTAM Status Display Beep on this pop-up correspond to the nine status bar lights displayed on the main status panel. The values for the entry fields (Yes or No) control which of the status bar lights can cause the terminal to beep when the main status panel is displayed. If Yes is specified for a status bar, the terminal will beep when a warning or critical condition exists and the panel is refreshed.

The beep option is specific to each individual user and is activated only when the user requests it. These settings are saved across OMEGAMON II sessions.
Network Manager Interface Options

You can toggle between OMEGAMON II and NetView or SOLVE:Netmaster by defining **Network Manager Options** as follows:

```
+------------------------------------------------+
| KONDONMD Network Manager Options               |
| Type network manager options and press Enter. |
| Network manager applid . . ________           |
| Network manager hotkey . . _____ +            |
| Network manager logmode . . ________          |
|                                              |
| F1=Help F4=Prompt F12=Cancel                 |
+------------------------------------------------+
```

**Figure 14. Network Manager Options Pop-up**

**Network Manager applid**

Enter the NetView or Netmaster applid you want to use.

**Network Manager hotkey**

Enter the name of the key you want to use to toggle between the network manager and OMEGAMON II. For a list of valid key choices, move the cursor into the **Network manager hotkey** input field and press F4. Once the key is defined, you can toggle between OMEGAMON II and the network manager, and perform the network manager transactions.

If you access OMEGAMON II from Candle's CL/SUPERSESSION or CL/CONFERENCE, be sure the hotkey you specify does not conflict with any CL/SUPERSESSION or CL/CONFERENCE control keys.

**Network Manager logmode**

If you want to use a different terminal logmode to sign onto NetView or Netmaster than you used to sign onto OMEGAMON II, enter the logmode in this field. Otherwise, OMEGAMON II defaults to the current logmode.

**Note:** When using the historical graphs feature of OMEGAMON II (see the information about SAS reporting in the *OMEGAMON II for VTAM Historical Reporting Guide*), an active NetView or Netmaster session is automatically terminated. This is because OMEGAMON II defines the generating of historical graphs as a background session and only one such session is allowed to run under OMEGAMON II.
**Printer Options**

You can capture a panel for later printing by pressing the Print key, F11. When you elect to print the captured panels, OMEGAMON II allocates a SYSOUT dataset and puts the panel images on the dataset. The panel images appear on SYSOUT under the job name or started task name for the OMEGAMON II address space.

Select **Printer Options** to define SYSOUT, destination, copies, fold, form, hold, and routing information for printing screen images. These printer options are also used when printing VTAM trace reports. You must complete this panel before you can request a printout of OMEGAMON II panels or traces.

<table>
<thead>
<tr>
<th>KONDOPOD</th>
<th>Printer Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>To reset a field to its default setting, clear the field.</td>
<td></td>
</tr>
<tr>
<td>Sysout class . . . . . A</td>
<td></td>
</tr>
<tr>
<td>Copies . . . . . . . 1_ (1-99)</td>
<td></td>
</tr>
<tr>
<td>Destination. . . . . . ________</td>
<td></td>
</tr>
<tr>
<td>Form name. . . . . . ____</td>
<td></td>
</tr>
<tr>
<td>Hold output. . . . . No + (Yes/No)</td>
<td></td>
</tr>
<tr>
<td>Fold to uppercase. . No + (Yes/No)</td>
<td></td>
</tr>
<tr>
<td>Routing information. . Send output to Linda Cummings___________</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 15. Printer Options Pop-up**

**Close Screen Print Log Option**

When you select this option, OMEGAMON II puts the panel images you have requested on the SYSOUT queue under the OMEGAMON II job or started task name. You receive a pop-up that tells you the number of panel captures that will be printed.

To print trace reports, see “Printing a Trace” on page 225.
Using the View Facility

Use the OMEGAMON II View facility to filter your VTAM data. You specify which data to display and in what order. When the view feature is available for a panel, the View choice appears on the action bar.

The figure below shows the choices available from the View pull-down for an Applications Analysis display (see “Applications Analysis” on page 283).

Note: The menu selections and some steps described below are specific to the Applications Analysis component of OMEGAMON II. The steps for using view in other components (i.e., virtual routes, historical graphs), may differ in details, but follow the same general procedure.

View first asks you to choose whether you want to view All (the default) or Some (a selected subgroup) of the data.

To sort all data in a display, perform the following steps:

1. Select All from the View pull-down.
2. Then, move the cursor to the next group of menu selections and enter a sort option.
3. From the sort pop-up, enter whether to sort in ascending (the default) or descending order. The sorted information displays.

Figure 16. View Pull-down Selections for VTAM Application Data
To sort a *subgroup* of data, perform the steps below.

1. Select **Some** from the View pull-down.

2. Then, move the cursor to the next group of menu selections, and enter a sort option. The View Some pop-up appears.

The View Some pop-up contains the following selection criteria:

**Field**  
Type of data chosen as the sort option in the preceding step (in this example, address space). This field is read-only.

**Operator**  
Logical operator that acts on the value. The default is EQ, which means equal to the value entered. Press F4 to prompt for the five other logical operators available:

- **GT**  
  Greater than.

- **GE**  
  Greater than or equal to.

- **LT**  
  Less than.

- **LE**  
  Less than or equal to.

- **NE**  
  Not equal to.

For example, specify NE to select and sort any data *not* matching the value you entered in the Value field.
Value   Subgroup key that you specify. To specify a generic value, enter the wildcard character asterisk(*) for the rest of the key value.

3. Enter whether to sort in ascending (the default) or descending order. The sorted data displays.

---

**Issuing OMEGAMON II Commands**

You can issue OMEGAMON II or VTAM commands in the `Command ==>` field at the bottom of every panel. Possible OMEGAMON II commands vary based on the current panel. For a description of available commands, press F1 or enter `Help` at the command line. Preface any VTAM command with `VTAM`.

These are some examples of OMEGAMON II commands.

**ABENDS**
Display internal diagnostic information if an abend occurs. Use this command under the direction of Candle Customer Support.

**ANALYZE**
Invoke the resource analysis feature by specifying either an LU name or a network address. Use the following format to specify a resource name:

```
ANALYZE LU=luname
```

where `luname` is a valid logical unit name. An LU name can be an applid, a terminal, or a CDRSC.

Use the following format to specify a network address:

```
ANALYZE NA=addr
```

where `addr` is the base element address. (Enter in decimal format.) Be sure to enter the base element address of a resource that is defined within this VTAM's subarea.

**KILLTSO**
Terminate the background session with TSO. Useful when finished viewing online historical graphs.

**LOG**
Display the internal diagnostic information message log. Use this command under the direction of Candle Customer Support.
SNAP *description*
Save a snapshot of the current panel, described by 1 to 40 characters, for later retrieval. For more details, see “Saving and Retrieving Panels” on page 61.

USERS
Display current OMEGAMON II users.

VIEW *description*
Retrieve the panel captured and described by SNAP. For more details, see “Saving and Retrieving Panels” on page 61.

VTAM *command*
Issue the VTAM command without having to first select the VTAM console.

---

### Exceptions and Messages

There are two kinds of OMEGAMON II messages:

**Exceptions**
From most panels, you can select the **Exceptions** action to display a list of exceptions, which describe current problems identified in the network for that component. You can then select an exception for which you can display an explanation and recommendations for resolving the problem.

“Exceptions” on page 347 lists all possible exceptions. For more information about exceptions, see “Monitoring Network Performance” on page 49.

**Product messages**
OMEGAMON II generates messages to provide necessary information or alert you to an error.

The messages are found in the manual *OMEGAMON II for VTAM Messages Manual*.
Chapter 2.
Monitoring Network Performance

Chapter Contents

Overview .......................................................... 50
Main Status Panel .................................................. 50
Navigation from Main Status Panel .......................... 51
Main Status Navigation ......................................... 52
Status Lights ....................................................... 53
  Exceptions ..................................................... 53
  VTAM Trace .................................................... 53
  Status Light Color .......................................... 53
  Main Status Beep ............................................. 54
Exception Displays ............................................... 55
  Exception Recommendations ................................. 56
  Exception Thresholds ......................................... 56
Navigating by the Goto Pull-down .......................... 56
Response Times .................................................. 58
Using Trend Data ................................................ 58
Overview

This chapter explains the facilities that OMEGAMON II uses to monitor performance. It begins by describing the OMEGAMON II main status panel, which provides status lights, exception detection, and navigation to the various OMEGAMON II data panels. The chapter then describes the exception monitoring facility, which displays a list of exceptions throughout the network. The chapter concludes with a description of OMEGAMON II's trending facility. This feature displays graphs of short-term trends for various kinds of network data.

Main Status Panel

After you log on, the main status panel appears (Figure 18).

Figure 18. OMEGAMON II for VTAM Main Status Panel

The main status panel is the initial panel that appears after logon. Its two main purposes are to:

- display status lights indicating network conditions or problems
- serve as a central navigation point
Navigation from Main Status Panel

The main status panel is the starting point for navigation to other panels. You can enter action code $ (Show Details) next to a component to see performance details about that component. Then, you can navigate to further panels within the component by using action codes or the Goto pull-down. Refer to the navigation chart at the end of this chapter and at the end of each component chapter (such as buffer pools, virtual routes, or monitoring options).

Also, on the main status panel you can enter action code $ (Exceptions) next to a component to see its current exceptions. Then you can enter action code $ (Show Recommendations) next to a specific exception to see recommendations for handling the exception.

The following figure summarizes the navigation leading from the main status panel.
Main Status Navigation
Status Lights

Of the nine status lights that comprise the central part of the Status Display, eight are exception indicators and one (VTAM Trace) signals the status of any ongoing VTAM trace activity. Status lights are dynamic, informing you of the state of your network in real time.

Exceptions

Exception indicators inform you of the condition of certain network resources that are monitored in the background. The data for the exceptions is generated and refreshed according to the sampling interval (usually 20 or 30 seconds) specified in the Monitoring Options for each OMEGAMON II component (see “Monitoring Options” on page 309). Status lights based on exceptions are available for:

- buffer pools
- virtual routes
- response times
- NCP performance (NCPs, lines, PUs, and LUs)
- tuning statistics for channel-to-channel (CTC) connections
- tuning statistics for NCPs
- tuning statistics for locals
- VTAM environment

VTAM Trace

This status light keeps you apprised of the status of any ongoing VTAM trace activity. Whereas exception indicators provide information on network thresholds, the VTAM Trace status light indicates whether or not one or more trace events have occurred.

Status Light Color

Exception indicators are colored status lights that supply network information. Each indicator can be one of four colors:

- **Green**: Normal condition.
- **Yellow**: Warning condition.
- **Red**: Critical condition.
- **Turquoise**: Idle or disabled.
The VTAM trace indicator uses color differently:

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Green</strong></td>
<td>Trace(s) active.</td>
</tr>
<tr>
<td><strong>Yellow</strong></td>
<td>Trace(s) completed.</td>
</tr>
<tr>
<td><strong>Turquoise</strong></td>
<td>No traces currently running.</td>
</tr>
<tr>
<td><strong>Red</strong></td>
<td>Trace(s) abended or PIUs were lost.</td>
</tr>
</tbody>
</table>

A text label is printed inside the status light. If your terminal does not support extended attributes, you see text labels of the conditions and no status lights (as shown in Figure 18 on page 50). You can customize the default text inside the colored status light by selecting Status Bar Options from the Options pull-down, and changing the appropriate field (see “Status Bar Options” on page 41).

If a yellow status light is present, there is a potential problem in the network; if a red light is present, there is a definite problem in the network. To investigate a problem, you can follow one of the procedures in the following section.

**Note:** To display green, yellow, and red status lights on the main status panel for buffer pools, virtual routes, NCP performance, or CTC, NCP, or local tuning statistics, you must enable exception recording to the VSAM Log File. Otherwise, the component's status light displays as Idle (turquoise). To specify exception recording for each component, select Monitoring Options on the Options pull-down.

### Main Status Beep

You can set any of the terminal beep options on the main status panel to alert you when there is a warning or critical condition for any specified component on the panel. The beep option is useful in autorefresh or normal operating mode. (See “Terminal Beep Option” on page 42.)

Although you can specify the beep option for the VTAM Environment component, use it with discretion. Depending on current system workloads, this component can frequently exceed exception thresholds.

You can activate both beep and autorefresh when you are running a VTAM trace. When the VTAM Trace status bar on the main status panel indicates that a trace has ended, the terminal will beep. Meanwhile you are free to do other work. The beep alerts you when the trace is ready to examine.
Exception Displays

To display exceptions for a network category for example, (buffer pools or virtual routes) tab to its entry field on the main status panel and enter X. You can display an exceptions list for any category except VTAM Trace and VTAM Environment.

Exception displays provide explanatory and quantitative information. Each exception shown is preceded by an identification number, the type of component (such as buffer pool, virtual route, or CTC), the time that the exception condition occurred, and an entry field.

You can also display a complete list of all the exceptions by selecting Exceptions from the Goto pull-down or by entering action code X on the command line. The following figure shows a sample panel for all exceptions being monitored in the network.

<table>
<thead>
<tr>
<th>Time</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>_ 13:44:56</td>
<td>BP</td>
<td>EX103 Buffer pool LF00 has 8 active extents allocated (over by 3)</td>
</tr>
<tr>
<td>_ 13:40:49</td>
<td>BP</td>
<td>EX103 Buffer pool LF00 has 8 active extents allocated (over by 3)</td>
</tr>
<tr>
<td>_ 13:36:35</td>
<td>BP</td>
<td>EX101 Total buffers in CRPL is 860 (over by 360)</td>
</tr>
<tr>
<td>_ 13:35:35</td>
<td>BP</td>
<td>EX103 Buffer pool LF00 has 8 active extents allocated (over by 3)</td>
</tr>
<tr>
<td>_ 13:35:35</td>
<td>BP</td>
<td>EX101 Total buffers in CRPL is 860 (over by 360)</td>
</tr>
<tr>
<td>_ 13:33:13</td>
<td>CTC</td>
<td>EX303 OC06 has 100.0 percent of its I/O due to priority PIUs (over by 90.0 %)</td>
</tr>
<tr>
<td>_ 13:33:13</td>
<td>CTC</td>
<td>EX303 OC15 has 81.0 percent of its I/O due to priority PIUs (over by 71.0 %)</td>
</tr>
<tr>
<td>_ 11:33:12</td>
<td>BP</td>
<td>EX107 TDCLS10 is using excessive buffers in the CRPL buffer pool. Number of buffers used is 80 (9.7 percent of the pool)</td>
</tr>
</tbody>
</table>

Figure 19. All Exceptions Panel

Exceptions are available for the current sampling interval as well as for previous sampling intervals. The period of time for which exceptions are retained for display is controlled with the Global Options selection of the Monitoring Options menu through the Options pull-down.
**Exception Recommendations**

To view an exception recommendation for a specific exception, enter action code $ preceding the exception message. An exception recommendation includes:

- explanation, implications, and objectives
- recommendations for improving the condition
- background information
- how to modify thresholds

**Exception Thresholds**

Most exceptions are generated as the result of a value exceeding a threshold. Default values for exception thresholds are supplied with the product. Users with administrator authority may change threshold values. Any user may view them. (See “Monitoring Options” on page 309.)

**Navigating by the Goto Pull-down**

In some components, such as NCP performance, resource analysis and trends are available by using action codes.

In other places, certain panels are accessed by selecting the Goto pull-down and choosing one of the selections. You can access All Exceptions, VTAM Console, Resource Analysis, and trending panels via the Goto pull-down. The Goto menu selections vary depending on the current panel. As an example, the Goto pull-down menu for the main status panel is shown below.
Figure 20. OMEGAMON II for VTAM Main Status Panel with Goto Pull-down

**Resource Analysis**  Provides a quicker and more direct path to detailed information about a specific resource (see “Resource Analysis” on page 77).

**VTAM console**  Takes you to the VTAM operator console, where you can enter VTAM commands (see “Using the VTAM Operator Console” on page 71).

**Exceptions**  Displays a global exceptions panel (see “Exceptions” on page 53).

For help accessing a trending display via the Goto pull-down, refer to the trending navigation chart at the end of each relevant component chapter.
Response Times

To monitor response times, the End-to-End™ Response Time Feature must be installed and enabled. If an incompatible version of the End-to-End Response Time Feature has been installed (versions earlier than ETE Version 500) or if an internal error occurs in the ETE module, the Response Time status light is turquoise and contains the word Error. Check the job log for messages. If ETE is the wrong version, see the OMEGAMON II for VTAM Configuration and Customization Guide, which also includes information on enabling and disabling ETE. If there seems to be an internal ETE module error, see the End-to-End Response Time Feature Reference Manual.

Response time monitoring requires the following:

1. End-to-End must be enabled and is the way OMEGAMON II is shipped.

2. Response time monitoring must be started. (See “How to Obtain Response Time Information” on page 188). The response time status light is set to turquoise and contains the word Idle until you start response time monitoring.

Using Trend Data

OMEGAMON II provides realtime network analysis data. While this information is useful, many network tuning decisions require data collection and analysis over longer periods of time. Trending displays, available for several OMEGAMON II selections, allow you to examine network data over the course of one or more days.

Trending information is available through the Goto pull-down for the following main status display selections:

- buffer pools
- virtual routes
- NCP performance
- tuning statistics for CTCs
- tuning statistics for NCPs
- tuning statistics for locals
The following figure shows a sample trend display for buffer pool usage. Each row lists pertinent data for the CRPL buffer pool and the recording interval in which data was collected. To set recording interval, sampling rate during those intervals, and hours of trending data to display, see “Monitoring Options” on page 309.

![Figure 21. Trend Display for Number of CRPL Buffer Pool Expansions](image)

In panels like this, the 100% point is set to the largest value found in an interval record (in this case 211). All other percentages are calculated against the 100% value.

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
Chapter 3. Saving and Retrieving Panels

Chapter Contents

Overview .................................................. 62
Snapshot Storage ...................................... 62
Saving a Panel Image ............................... 63
Retrieving a Panel Image by Description .......... 64
Using the Snapshot Directory ...................... 64
  Displaying a Snapshot ............................ 64
  Finding a Snapshot .................................. 64
  Printing a Snapshot ............................... 65
  Deleting a Snapshot .............................. 65
Snapshot Panels ........................................ 66
  User Note Pop-up .................................... 66
  Duplicate Description Pop-up ..................... 66
Snapshot Directory .................................... 67
  Snapshot Display .................................... 68
  Find Description Pop-up .......................... 69
Overview

This feature uses the facilities of the SNAP and VIEW commands. You use SNAP and VIEW to take a snapshot of an OMEGAMON II panel image and later retrieve it. You can use these commands to

- save and retrieve panel images across OMEGAMON II sessions
- prevent accidental snapshot replacement
- select snapshots from an individual user's directory
- print current or saved snapshots

You might save and retrieve or print snapshots of OMEGAMON II displays

- when there is an existing or potential network problem for problem reporting and determination
- to see network status occurring at various times of the day
- to compare trends of vital network statistics

Snapshot Storage

Snapshots are saved in a snapshot directory for each user under a unique description. The snapshot directory panel lists your snapshots. You can select from the directory panel to view, print, or delete snapshots.

Snapshots are stored in the Tables Database until user deletion. Although the Tables Database is a VSAM file which can extend, keep in mind that space is not unlimited. If the Tables Database runs out of space, error message KONCV116 will display.
Saving a Panel Image

To save a panel image for later retrieval, follow these steps.

1. On any OMEGAMON II panel that contains a command line at the bottom, enter SNAP on the command line followed by a description.

   SNAP description

   where description is 1 to 40 characters (including imbedded spaces).

   Result: The User Note pop-up appears. (See Figure 22 on page 66.)

2. Enter additional descriptive information or bypass entering a note by immediately pressing Enter or F12.

   Result: The result and next action differs depending on the description you entered with the SNAP command. See step 3.

3. Do one of the following:

   a. If you entered a unique description, no further action is required. The snapshot is saved in your own snapshot directory and a confirmation message appears above the command line.

      KONCV025 Request successful

   b. If you entered a description that already exists, a Duplicate Snapshot Description pop-up appears (see Figure 23 on page 66). Do one of the following:

      1) If you do not want to replace the existing snapshot, enter another description that is unique.

         Result: Both the existing and new snapshots are saved and the KONCV025 confirmation message appears.

      2) If you want to replace the previously existing snapshot, press Enter.

         Result: The new snapshot is saved under the same name, replacing the existing snapshot, and the KONCV025 confirmation message appears.
Retrieving a Panel Image by Description

When you know the exact description of a previously save snapshot, on the command line of any OMEGAMON II panel that contains a command line, enter

```
VIEW description
```

where description is the exact description used when the snapshot was saved.

**Result:** The saved panel image appears with your description on the top line and the user note at the bottom right corner. The user note does not replace significant data. (See Figure 25 on page 68.)

Using the Snapshot Directory

When you do not know the snapshot description, enter `VIEW` without a description.

```
VIEW
```

**Result:** A directory of all of your snapshots appears, in alphabetical order by description. (See Figure 24 on page 67.)

Displaying a Snapshot

To display a snapshot, enter action code $ (Show Snapshot) next to the description on the directory panel.

**Result:** The panel image appears with your description and annotation. (See Figure 25 on page 68.)

Finding a Snapshot

To locate your snapshot from a long directory listing:

1. Press F14 (Find).

   **Result:** The Find Description pop-up appears. (See Figure 26 on page 69.)

2. Enter a partial snapshot description in the pop-up.

   **Result:** The snapshot directory scrolls to the nearest matching description.
Printing a Snapshot

To print a snapshot, follow this procedure.

1. Enter action code N (Print Snapshot) next to the description on the directory panel.

   **Result:** The Screen Print Processing pop-up appears, giving you further instructions.

2. To proceed, press Enter.

   **Result:** The Screen Print Processing pop-up disappears.

3. To actually print the snapshot, select **Options** from the action bar and then select **Close Screen Print Log**.

   **Result:** A confirmation message appears.

   KONCV090 n screens routed for printing

Deleting a Snapshot

To delete a snapshot from the directory, enter action code D (Delete Snapshot) next to the description on the directory panel.

**Result:** The description disappears from the directory, and the snapshot is no longer available.
Snapshot Panels

The following panels and pop-ups are unique to saving and retrieving panel images using the SNAP and VIEW commands.

User Note Pop-up

When you request a snapshot, the User Note pop-up appears so you can annotate your snapshot.

```
KONDSNP1 User Note
This is an example of a user note that provides some additional information about the panel image.
F1=Help F12=Cancel
```

Figure 22. Enter a User Note

To bypass the note, press Enter or F12 immediately. Otherwise, enter your additional description information.

Duplicate Description Pop-up

When you enter a snapshot description that already exists, the Duplicate Snapshot Description pop-up appears.

```
KONDSNVR Duplicate Snapshot Description
The snapshot description that you specified when the SNAP command was issued, already exists. Simply press Enter to replace the existing snapshot or type a new snapshot description and press Enter.
Snapshot description . . . CONSOLE OUTPUT 2
F1=Help F12=Cancel
```

Figure 23. Duplicate Snapshot Description Pop-up

To replace the existing snapshot, press Enter. To keep the existing snapshot and also save the one requested, enter a new unique description.
When you enter VIEW without a description, the Snapshot Directory appears.

```plaintext
<table>
<thead>
<tr>
<th>Description</th>
<th>Notes</th>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUFFER POOL 1000 EXTENTS</td>
<td>YES</td>
<td>06/10/92</td>
<td>14:05:12</td>
</tr>
<tr>
<td>BUFFER POOL START OPTIONS</td>
<td>YES</td>
<td>01/19/92</td>
<td>10:32:05</td>
</tr>
<tr>
<td>BUFFER POOL WP00 EXTENTS</td>
<td>NO</td>
<td>06/12/92</td>
<td>11:09:14</td>
</tr>
<tr>
<td>CONSOLE OUTPUT 2</td>
<td>YES</td>
<td>10/14/92</td>
<td>18:20:02</td>
</tr>
<tr>
<td>CTC TNSTATS</td>
<td>YES</td>
<td>10/04/92</td>
<td>15:22:08</td>
</tr>
<tr>
<td>LOCAL TNSTATS</td>
<td>NO</td>
<td>12/14/92</td>
<td>17:02:55</td>
</tr>
<tr>
<td>NCP TNSTATS ANALYSIS</td>
<td>NO</td>
<td>05/15/92</td>
<td>09:15:51</td>
</tr>
<tr>
<td>RESPONSE TIME GROUPS</td>
<td>NO</td>
<td>04/04/92</td>
<td>09:18:01</td>
</tr>
<tr>
<td>RESPONSE TIME TERMINALS</td>
<td>YES</td>
<td>04/08/92</td>
<td>10:17:45</td>
</tr>
<tr>
<td>VIRTUAL ROUTEB BLOCKED</td>
<td>YES</td>
<td>01/01/92</td>
<td>10:18:41</td>
</tr>
<tr>
<td>VTAM CONSOLE D NET,APPLS COMMAND</td>
<td>NO</td>
<td>07/30/92</td>
<td>14:08:03</td>
</tr>
</tbody>
</table>
```

Notice that action codes S (Show snapshot), N (Print), and D (Delete) are available.

Figure 24. Snapshot Directory Panel
Snapshot Display

When you select a snapshot for viewing with the VIEW command or from the snapshot directory panel, your saved panel image appears as in the example below. Notice the description at the top of the panel and the user note at the bottom right. The user note appears in the command and function key lines so that you can view all the significant data in the snapshot.

<table>
<thead>
<tr>
<th>KONDVCD</th>
<th>VTAM Console</th>
<th>System: SYSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lines 1 to 15 of 1919</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

KONDVCD VTAM Console System: SYSA

---

User Note
This note provides an additional description of this panel image.

F11=Print  F12=Cancel

Figure 25. Snapshot Display Panel

Notice that the snapshot display has no action bar.

The only function keys available are

**F11 (Print)** Sends the panel image to the screen print log, which must be closed for actual printing (see the Options pull-down).

**F12 (Cancel)** Returns to the panel where you first entered the VIEW command.
When you press F14 (Find) while on the Snapshot Directory panel, the Find Description pop-up helps you locate your snapshot.

```
+--------------------------------------------------------------+
| KONDSNVF Find Description                                   |
| Type a snapshot description and press Enter.                 |
| Description . . cons_______________________________________|
| F1=Help  F12=Cancel                                        |
+--------------------------------------------------------------+
```

**Figure 26. Find Description Pop-up**

After you enter a partial description, the snapshot directory scrolls to the nearest matching description.

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
Chapter 4.
Using the VTAM Operator Console

Chapter Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>72</td>
</tr>
<tr>
<td>Issuing VTAM Commands</td>
<td>72</td>
</tr>
<tr>
<td>Getting Help</td>
<td>74</td>
</tr>
<tr>
<td>Retrieving Commands</td>
<td>76</td>
</tr>
</tbody>
</table>
Overview

You can issue VTAM operator commands directly from any OMEGAMON II panel, if you have been granted VTAM console access by your system administrator. OMEGAMON II also provides a console panel that logs and displays your VTAM commands and the resulting output; you can browse the console log as needed. Help windows provide templates of correct command syntax, and you can save and retrieve frequently issued commands. You can issue any VTAM command except HALT from OMEGAMON II.

Make sure that the OMEGAMON II console applid prefix specified in the Global Options selection of the Monitoring Options menu (accessed by the Options pull-down menu) agrees with the VTAMLST member used to define OMEGAMON II to VTAM. The applid prefix is the first six characters of the real applid name.

Issuing VTAM Commands

You can display the VTAM console from any panel by pressing F6. The VTAM Console panel appears.

For more information about the options on the Goto pull-down menu from the VTAM Console panel, see “Using the Goto Pull-down” on page 80.

---

### VTAM Command__________________________________________________________________

F1=Help F2=Keys F3=Exit F4=Clear **=Bkwd F8=Fwd F9=Retrieve
F10=Action Bar F11=Print F12=Cancel F15=Status_Display

Figure 27. VTAM Console Panel
You can issue VTAM operator commands at the VTAM Command line, or you can select commonly used commands through the Commands action bar choice.

To select and issue a command, follow these steps:

1. Select **Commands** from the action bar.

   The Commands pull-down menu shows four choices:

   **User**
   Stores your own selection of 1–50 commands in the User pop-up window for later retrieval.
   
   Once you have stored your personal VTAM commands, you can use fastpath selection characters to expedite the entry of these commands. For example, you can enter CU25 in the action bar entry field to retrieve the 25th command you specified in the User Commands pop-up.

   Enter commands in uppercase and command operands in lowercase. The cursor is positioned at the beginning of the lowercase operand, when the command is displayed, so that you can overtype it.

   **Display**
   Lists frequently used D NET,... commands.

   **Modify**
   Lists F NET,... commands.

   **Vary**
   Lists V NET,... commands.

2. Place the cursor to the left of the type of command you want to issue, and press Enter.

   A list of commands appears in a pop-up window.

3. Position the cursor to the left of the command you want to issue, or enter the selection number.

   The full command appears on the VTAM Command line at the bottom of the panel.

4. Edit the command if necessary. Pressing Enter issues the command.

   The resulting command output appears on your screen. If the console log is several panels long, use F8 and F7 to scroll through it; or select Browse from the action bar to navigate quickly to the specific information you want.

   You can use a string of selection letters in the action bar entry field to fastpath directly to a console log browse command. For example, if you enter BT, the console output display scrolls to the top. If you enter BB, the console output scrolls to the bottom.
5. To clear the console log, press F4. Until you either press F4 or exit OMEGAMON II, the console log is retained, and you can switch to other screens and then back to the console log display.

You can also issue VTAM commands directly from the Command ===> line of any panel by prefacing the command with VTAM (for example, VTAM V NET,ACT,ID=TERM001). This method of entering VTAM commands is useful when you are viewing an OMEGAMON II panel and want to enter several commands based on the display (for example, when you are viewing Applications by Address Space). The action bar VTAM command selections and the console help windows are available only on the VTAM Console panel.

Getting Help

For help on any command listed in a pull-down menu, position the cursor to the left of the command and press F1. A help window explains the command, shows the syntax, and provides a VTAM command line with the command already filled in. You can edit the command and issue it directly from the help window.

For example, suppose you want a list of all active application program major nodes and their associated minor nodes. From the VTAM Console screen action bar, select Commands and then select Display. The VTAM Display Commands pop-up appears.

Figure 28. VTAM Display Commands Pop-up
The command you need (D NET, APPLS) is choice 2 on the list. However, if you issue the command as shown, the resulting display will show all applications, whether active or inactive.

If you cannot remember how to limit the console display to the active applications, position your cursor to the left of choice 2, D NET,APPLS and press F1 (see the previous). A help window appears as shown below.

Figure 29. VTAM Command Help

The help window describes the command, shows the syntax, and gives you three choices for the SCOPE parameter: ACT, ALL, or INACT. At the bottom of the help window, the full command has already been entered for you. All you have to do is enter ALL instead of ACT.
**Retrieving Commands**

Until you clear the log (by pressing F4), log off OMEGAMON II, or restart VTAM, you can retrieve any command already issued. Press F9 once to retrieve the most recently issued command, twice to retrieve the previous command, and so on.

You can add the commands you most often use to the list on the VTAM User Commands panel. To access the User Commands pop-up, first select **Commands** from the action bar, then select **User** from the Commands pull-down. Enter your command to the right of one of the list numbers to store the command.

To retrieve a command stored in the User Commands list, position the cursor to the left of the command and press Enter. The command appears on the **VTAM Command** line at the bottom of the panel. Edit the command, if necessary, and issue it by pressing Enter.
Overview

The resource analysis feature adds a powerful problem-solving tool to OMEGAMON II’s set of resource analysis tools. This feature provides a direct path to detailed information about a specific resource.

Resource analysis enables you to view information about three types of resources: applications, terminals, and cross-domain resources (CDRSCs).

Both summary information and detailed session-level information are available. You can access information about control blocks and VTAM tables used for a particular resource or session.

Resource Types

The following are definitions of the resource types used with the resource analysis feature.

<table>
<thead>
<tr>
<th>Resource Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applid</td>
<td>Name of an application defined to VTAM in this domain.</td>
</tr>
<tr>
<td>CDRSC</td>
<td>Name of a resource defined within another VTAM's domain.</td>
</tr>
<tr>
<td>Terminal</td>
<td>Name of a resource defined to VTAM within this domain, using the LU, LOCAL, or TERMINAL definition statement.</td>
</tr>
</tbody>
</table>

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
Analyzing VTAM Resources

Resource analysis allows you to choose among three points of entry:

- from the Goto pull-downs on the VTAM console and main status panels
- from the command line with the ANALYZE command (see “Issuing OMEGAMON II Commands” on page 47)
- from Virtual Route, Buffer Pools, Response Times, and NCP panels that include a Resource Analysis action code

Each of these methods allows you to select a resource to analyze (either by name or by its network address).

The data presented depends upon the type of resource selected: an applid, a terminal, or a CDRSC.

The following process explains how to analyze your selected resource.

1. When you select a resource, OMEGAMON II displays a panel that shows summary information.
2. From this panel, you can navigate to the panels displaying information about the active sessions for that resource.
3. You can then access information about control blocks and VTAM tables used for a particular session. Authorized users can also access VTAM console operator facilities.
Using the Goto Pull-down

Use the following procedure to invoke resource analysis from the Goto pull-down.

1. Select Goto from the action bar either on the main status or VTAM console panel.
   **Result:** The Goto pull-down appears.

2. Select Resource Analysis.
   **Result:** The Resource Analysis pop-up appears.

   +----------------------------------------------------------+
   | KONDAFPP Resource Analysis                                |
   |                                                           |
   | Enter a resource name or network address (in decimal).    |
   |                                                           |
   | Resource name... ________                                |
   | Network address... ________                             |
   |                                                           |
   | F1=Help F12=Cancel                                       |
   +----------------------------------------------------------+

   **Figure 30. Resource Analysis Main Status Pop-up**

3. Specify a resource name or network address. (The network address must be the base element address.)
   **Result:** The corresponding panel appears. See the following table.

<table>
<thead>
<tr>
<th>IF...</th>
<th>THEN...</th>
</tr>
</thead>
<tbody>
<tr>
<td>you specify an applid</td>
<td>the Resource Analysis for an Applid panel appears (Figure 31 on page 81)</td>
</tr>
<tr>
<td>you specify a terminal</td>
<td>the Resource Analysis for a Terminal panel appears (Figure 32 on page 82)</td>
</tr>
<tr>
<td>you specify a CDRSC</td>
<td>the Resource Analysis for a CDRSC panel appears (Figure 33 on page 83)</td>
</tr>
</tbody>
</table>
If you specify a resource that is an applid, the following panel appears.

**Figure 31. Resource Analysis for an Applid**

To access more information, select the Goto pull-down menu from the action bar and select **Sessions** or **Control Blocks**.

<table>
<thead>
<tr>
<th>IF...</th>
<th>AND IF...</th>
<th>THEN...</th>
</tr>
</thead>
<tbody>
<tr>
<td>you select <strong>Sessions</strong></td>
<td>only one session is available</td>
<td>the Session Analysis panel appears (Figure 35 on page 85)</td>
</tr>
<tr>
<td>you select <strong>Sessions</strong></td>
<td>more than one session is available</td>
<td>the LUs in Session with a Resource panel appears (Figure 34 on page 84)</td>
</tr>
<tr>
<td>you select <strong>Control Blocks</strong></td>
<td></td>
<td>the VTAM Control Blocks for Applid panel appears (“VTAM Control Blocks for Applid” on page 297)</td>
</tr>
</tbody>
</table>
Resource Analysis for a Terminal Panel

If you specify a resource that is a terminal, the following panel appears.

![Resource Analysis for Terminal Panel]

Figure 32. Resource Analysis for Terminals

To display session information, select **Sessions** from the Goto pull-down (or enter **GS** in the action bar entry field).

<table>
<thead>
<tr>
<th>IF...</th>
<th>AND IF...</th>
<th>THEN...</th>
</tr>
</thead>
<tbody>
<tr>
<td>you select <strong>Sessions</strong></td>
<td>only one session is available</td>
<td>the Session Analysis panel appears (Figure 35 on page 85)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>you select <strong>Sessions</strong></td>
<td>more than one session is available</td>
<td>the LUs in Session with a Resource panel appears (Figure 34 on page 84)</td>
</tr>
</tbody>
</table>

82 OMEGAMON II for VTAM User's Guide Version 500
If you specify a resource that is a cross-domain resource (CDRSC), the following panel appears.

![Resource Analysis for CDRSC Panel](image)

**Figure 33. Resource Analysis for a CDRSC**

To display session information, select **Sessions** from the Goto pull-down (or enter **GS** in the action bar entry field).

<table>
<thead>
<tr>
<th>IF...</th>
<th>AND IF...</th>
<th>THEN...</th>
</tr>
</thead>
<tbody>
<tr>
<td>you select <strong>Sessions</strong></td>
<td>only one session is available</td>
<td>the Session Analysis panel appears (Figure 35 on page 85)</td>
</tr>
<tr>
<td>you select <strong>Sessions</strong></td>
<td>more than one session is available</td>
<td>the LUs in Session with a Resource panel appears (Figure 34 on page 84)</td>
</tr>
</tbody>
</table>
LUs in Session with a Resource Panel

If more than one session exists for a given resource, this panel is displayed when you select Sessions on the Goto pull-down for any of the following panels:

- Resource Analysis for an Applid panel
- Resource Analysis for a Terminal panel
- Resource Analysis for a CDRSC panel

If only one session exists, the panel shown in Figure 35 on page 85 appears.

The panel displays one line for each LU that is in session with the selected resource.

<table>
<thead>
<tr>
<th>LU Name</th>
<th>Status</th>
<th>Resource Type</th>
<th>Acts</th>
<th>SA</th>
<th>VR</th>
<th>TP</th>
<th>Network ID</th>
<th>CID</th>
</tr>
</thead>
<tbody>
<tr>
<td>_ ATERM454</td>
<td>ACTIVE</td>
<td>CDRSC</td>
<td>SLU</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>USCAC001</td>
<td>0E00134</td>
</tr>
<tr>
<td>_ ATERM455</td>
<td>ACTIVE</td>
<td>CDRSC</td>
<td>SLU</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>USCAC001</td>
<td>6E00008A</td>
</tr>
<tr>
<td>_ ATERM465</td>
<td>ACTIVE</td>
<td>CDRSC</td>
<td>SLU</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>USCAC001</td>
<td>02000107</td>
</tr>
<tr>
<td>_ ATERM483</td>
<td>ACTIVE</td>
<td>CDRSC</td>
<td>SLU</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>USCAC001</td>
<td>2000020</td>
</tr>
<tr>
<td>_ L0048532</td>
<td>ACTIVE</td>
<td>CDRSC</td>
<td>SLU</td>
<td>10</td>
<td>0</td>
<td>1</td>
<td>USCAC001</td>
<td>10000097</td>
</tr>
</tbody>
</table>

Figure 34. LUs in Session with a Resource

To display more information about a session, enter action code $ (Session Analysis) next to the LU name. The Session Analysis panel shown in Figure 35 on page 85 appears.
Session Analysis Panel

If only one session exists for a given resource, this panel is displayed when you select Sessions on the Goto pull-down for any of the following panels:

- Resource Analysis for an Applid panel
- Resource Analysis for a Terminal panel
- Resource Analysis for a CDRSC panel

This panel also displays if you select a session from the LUs in Session with a Resource panel (Figure 34 on page 84).

The panel displays session-related information for the selected resource in the upper box and partner-specific information in the lower boxes.

Figure 35. Session Analysis Panel

For additional session-level information on control blocks and VTAM tables, select the Goto pull-down. The pull-down shown in Figure 36 on page 86 appears.
Session Analysis Goto Pull-down

To list the session control blocks and VTAM tables for the selected session, select **Goto** from the action bar on the Session Analysis panel.

![Goto Pull-down menu](image)

**Figure 36. Session Analysis Goto Pull-down**

Select the control block or VTAM table of interest. Panels showing control blocks or VTAM tables display in dump format.
Figure 37. Resource Analysis Navigation
# Part II: VTAM Tuning with OMEGAMON II

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Buffer Pool Analysis</td>
<td>91</td>
</tr>
<tr>
<td>7</td>
<td>Virtual Routes</td>
<td>117</td>
</tr>
<tr>
<td>8</td>
<td>Tuning Statistics</td>
<td>141</td>
</tr>
<tr>
<td>9</td>
<td>Response Time</td>
<td>181</td>
</tr>
<tr>
<td>10</td>
<td>VTAM Trace</td>
<td>201</td>
</tr>
<tr>
<td>11</td>
<td>VTAM Environment</td>
<td>229</td>
</tr>
<tr>
<td>12</td>
<td>TCP/IP</td>
<td>267</td>
</tr>
<tr>
<td>13</td>
<td>Applications Analysis</td>
<td>283</td>
</tr>
</tbody>
</table>
# Chapter 6.
## Buffer Pool Analysis

## Chapter Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>92</td>
</tr>
<tr>
<td>Types of Buffer Pool Allocation</td>
<td>92</td>
</tr>
<tr>
<td>Storage Usage</td>
<td>93</td>
</tr>
<tr>
<td>VTAM Buffer Pools</td>
<td>94</td>
</tr>
<tr>
<td>How To Define a VTAM Buffer Pool</td>
<td>94</td>
</tr>
<tr>
<td>Rules for Expansion and Contraction</td>
<td>95</td>
</tr>
<tr>
<td>Example of Buffer Definition Parameters</td>
<td>96</td>
</tr>
<tr>
<td>I/O Buffer Pool</td>
<td>96</td>
</tr>
<tr>
<td>CRPL Buffer Pool</td>
<td>97</td>
</tr>
<tr>
<td>Tuning Buffer Pools with OMEGAMON II</td>
<td>97</td>
</tr>
<tr>
<td>Selecting a Buffer Pool</td>
<td>98</td>
</tr>
<tr>
<td>Displaying the Start Options</td>
<td>99</td>
</tr>
<tr>
<td>Detecting Allocation Problems</td>
<td>100</td>
</tr>
<tr>
<td>Thrashing</td>
<td>101</td>
</tr>
<tr>
<td>Tuning a Buffer Pool with Trending Data</td>
<td>102</td>
</tr>
<tr>
<td>Historical Reports</td>
<td>103</td>
</tr>
<tr>
<td>IO00 Buffer Pool Usage by Category</td>
<td>104</td>
</tr>
<tr>
<td>IO00 and CRPL Usage by Address Space</td>
<td>105</td>
</tr>
<tr>
<td>IO00 Usage by Application</td>
<td>106</td>
</tr>
<tr>
<td>Buffer Pool Extents</td>
<td>107</td>
</tr>
<tr>
<td>Case Study: Recognizing and Correcting Thrashing</td>
<td>108</td>
</tr>
<tr>
<td>Initial Approach</td>
<td>108</td>
</tr>
<tr>
<td>Sequence of Actions</td>
<td>108</td>
</tr>
<tr>
<td>Examining Usage by Address Space</td>
<td>109</td>
</tr>
<tr>
<td>Optimizing the VTAM Startup Parameter Values</td>
<td>111</td>
</tr>
<tr>
<td>Implementing the Changes</td>
<td>113</td>
</tr>
<tr>
<td>Buffer Pools Component Navigation</td>
<td>114</td>
</tr>
<tr>
<td>CRPL Buffer Pool Trending Navigation</td>
<td>115</td>
</tr>
</tbody>
</table>
Overview

The Buffer Pool Analysis component displays realtime, trending, and historical information about VTAM buffer pool allocation. This chapter explains how VTAM uses these buffer pools and also guides you through the principal techniques for tuning buffer pools.

Types of Buffer Pool Allocation

VTAM uses buffer pools to allocate and deallocate space for VTAM control blocks, network traffic, and channel programs. You define these pools at VTAM startup, at which point several key decisions must be made.

One decision is whether to set the size of a buffer pool at startup, or let it increase or decrease depending upon demand. If you set the size at startup, you need to know the maximum potential demands for storage and set the buffer pool size slightly higher than the maximum. This is called static or base allocation.

If you allow the size of a buffer to increase or decrease depending upon demand, you have dynamic allocation. In this case, smaller base allocation values can be specified and peak demands on the pool will be met dynamically. Expansion occurs during temporary peak demands or unexpectedly high demands for buffers, and contraction occurs when these buffers are no longer needed.
Dynamic allocation can increase the efficiency with which VTAM uses storage, particularly for I/O buffers. Figure 38 shows a comparison of static versus dynamic allocation, and illustrates the potential advantage of using dynamic allocation.

![Graph showing comparison of static and dynamic allocation](image)

**Figure 38. VTAM Storage Utilization with Static vs. Dynamic Allocation**

When you tune a buffer pool, you optimize the tradeoff between CPU usage and the amount of storage allocated. If you specify a large base allocation, you may waste storage but conserve CPU usage. If you specify a small pool, you may conserve storage but use the CPU for frequent expansion and contraction. The goal of buffer pool tuning is to balance these resources in a way that best suits your network, ensuring that storage is available for users as needed.
VTAM Buffer Pools

Listed below are the VTAM buffer pools. Of these, the CRPL and IO00 (discussed in more detail below) are the most important. Two buffer pools (XD00 and BS00) apply to VTAM Version 3.4 and above.

- **IO00**: Input-output (I/O) message storage pool.
- **LP00**: Large pageable storage pool.
- **WP00**: Message control pageable storage pool (VTAM V3.3 only).
- **CRPL**: Copied RPL storage pool.
- **SP00**: Small pageable storage pool.
- **LF00**: Large fixed storage pool.
- **SF00**: Small fixed storage pool.
- **AP00**: Buffer pool below the 16-Mb line.
- **XD00**: Exchange Identifier (XID) pool (VTAM V3.4 and above).
- **BS00**: Boundary node pool (VTAM V3.4 and above).

All of the buffer pools are allocated in extended CSA, except for AP00, which is located in CSA.

### How To Define a VTAM Buffer Pool

The definition for a VTAM buffer pool is part of the START options member ATCSTRxx, in the VTAMLST dataset, as described below.

```
  poolname=(BASENO,BUFSIZE,SLOWPT,F|P,XPANNO,XPANPT,XPANLIM)
```

- **BASENO**: Initial number of buffers in the pool, and can range from 1–32767 (base allocation).
- **BUFSIZE**: Size in bytes of each buffer in the pool. Only the size for the I/O buffer pool can be specified.
  
  The BUFSIZE specified does not include headers. To estimate storage needs, you need to round the number to a multiple of eight, and then add 16 bytes to the result.

  For IO00 only, add 55 bytes to the BUFSIZE number, round to a multiple of eight, and add 16 bytes to the result.

  IBM recommends that the UNITSZ parameter on the HOST macro of the NCP be the same value as BUFSIZE.

- **SLOWPT**: Number of buffers available for priority requests. When the available buffers are equal to or less than SLOWPT, VTAM enters slow-down mode.
Whether the storage is fixed (F) or pageable (P). VTAM specifies a default for each pool.

**XPANNO**
Number of buffers allocated when VTAM expands the buffer pool. XPANNO can range from 0–32767, where 0 indicates that VTAM will not perform dynamic expansion or contraction for the specified pool. VTAM rounds up XPANNO to fit in full-page increments. Pages are contiguous when allocated.

**XPANPT**
Point at which VTAM schedules expansion for the buffer pool. When available buffers are equal to or less than XPANPT, VTAM enters expansion mode.

**XPANLIM**
Maximum allowable size of the buffer pool. If XPANLIM=BASENO, the XPANNO and XPANPT values are ignored. XPANLIM applies only to the I/O buffer pool.

After modifying any of the above parameters for a buffer pool, you must restart VTAM for them to take effect.

**Rules for Expansion and Contraction**

A VTAM buffer pool begins expansion when the number of free or available buffers in the pool decreases to the expansion point (XPANPT). The buffer pool expands by the value set by XPANNO.

A VTAM buffer pool attempts contraction when the number of free or available buffers is twice the expansion increment plus the expansion point:

\[
\text{CONTRACTION POINT} = (2 \times \text{XPANNO}) + \text{XPANPT}
\]

Like expansion, contraction occurs in increments of the value set by XPANNO, rounded to page sizes. In addition, the entire page of buffers must be free. If some of the buffers from the page are in use, contraction cannot take place. Full pages of free buffers in the base allocation are ineligible for contraction.
**Example of Buffer Definition Parameters**

Suppose we assign the following buffer definition parameters to the I/O buffer pool, IO00.

\[ \text{IO00} = (500, 128, 5, 20, 25, 2000) \]

This tells us the following:

1. The base allocation of buffers is 500, with the size of each buffer set to 128 bytes (excluding VTAM headers).
2. Using a null string for the fourth parameter specifies the default for IO00, which is F for fixed storage.
3. If there are 25 buffers or fewer available at any given time, VTAM will undergo dynamic expansion.
4. When IO00 undergoes dynamic expansion, VTAM will request 20 buffers at a time. Since only 20 buffers, each of 128 bytes, will fit on a page, VTAM gets one page at expansion. The maximum number of buffers that IO00 can expand to is 2000.
5. If there are 65 or more free buffers available at any given time (based on the formula in “Rules for Expansion and Contraction” on page 95: \( 2 \times 20 + 25 = 65 \)), VTAM will attempt to contract the pool in full-page increments.
6. At least five buffers are available for priority requests; if only those buffers are available, VTAM enters slowdown mode. At this time, priority requests are honored while nonpriority requests are queued.

**I/O Buffer Pool**

All of the network Path Information Units (PIUs) flow through the I/O buffer pool. Because of this, IO00 is sensitive to dynamic fluctuations in traffic rates. Consequently, it is a prime candidate for tuning.

The buffer size specified for IO00 is used to hold PIUs. VTAM appends a 16- and a 55-byte header to the front of each buffer, and uses that space to allocate a Transmission Subsystem Control Block (TSCB). The PIU is contained in the buffer after the TSCB.

Because a great deal of activity takes place in IO00, it is especially prone to **thrashing**, a condition of rapid and excessive buffer expansion and contraction. The detection and prevention of thrashing is the focus of later sections and of the case study at the end of this chapter.
Request Parameter List (RPL) control blocks for a VTAM application reside in the application's private storage area. Each RPL describes an API request to VTAM. These requests include starting and terminating sessions, as well as sending and receiving data.

Because these RPLs are located in private storage, they cannot be easily accessed by VTAM. VTAM addresses this problem by copying the RPL control blocks into extended CSA, and using the copies, called CRPLs (for Copied RPLs), to manage requests. The CRPLs may subsequently be modified by VTAM; for example, by the inclusion of error codes and sequence numbers. VTAM overlays the original RPL with the updated CRPL after the operation has been completed.

Tuning Buffer Pools with OMEGAMON II

OMEGAMON II monitors and displays the data you need to tune VTAM buffer pools. If the status light for buffer pools is green on the Main Status Display, all the buffer pools are functioning normally. If the status light for buffer pools is yellow or red, you can locate the source of the problem by entering X next to Buffer pools. This displays a list of the exceptions for buffer pools, which can help guide your use of the buffer pool options explained in the following sections. (See “Exceptions” on page 53 for details of exception monitoring.)

OMEGAMON II buffer pool analysis is dependent upon values contained in VTAM's buffer pool control blocks. Depending on the release of VTAM, some or all of these values are reset each time a VTAM SMS trace record is written. Consequently, you should disable VTAM SMS recording whenever conducting buffer pool analysis with OMEGAMON II.

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
Selecting a Buffer Pool

The Buffer Pools Status Display, as shown below, lists the VTAM buffer pools, followed by a description and a condition indicator.

---

The Buffer Pools Status Display, as shown below, lists the VTAM buffer pools, followed by a description and a condition indicator.

---

Figure 39. Buffer Pools Status Display

This panel displays the buffer pools for VTAM release 3.4.0 and above. A similar panel (KONDBMMD) shows the buffer pools for prior VTAM releases with WP00 included and XD00 and BS00 excluded.

If a condition indicator is yellow (warning) or red (critical), it is telling you that a problem exists with the specific buffer pool. You can use this information to select the VTAM buffer pool for detailed realtime and trending analysis. Next to a buffer pool of interest, enter an action code to select the kind of data you want to examine. The action codes provide information on Exceptions (X), Statistics (S), Extents (E), Usage (U), Start Options (O), and User Categories (G).
Displaying the Start Options

If you select Start Options, you see a panel that supplies the buffer pool values from the last time VTAM was started (see the following figure). Most of the items are the parameters used to define the buffer pool. These values do not change dynamically. You must respecify them in VTAMLST and restart VTAM.

This panel also shows the number of buffers currently allocated in the named pool and provides information for both private and residual storage.

---

| Number of buffers in base allocation. | BASENO | 442 (102,644 bytes) |
| Size of buffers in bytes. | BUFSIZE | 160 (Actual 232) |
| Slowpoint in available buffers. | SLOWPT | 3 |
| Expansion number of buffers. | XPNNO | 64 (Actual 68) |
| Expansion point in available buffers. | XPNPT | 4 |
| Contraction point in available buffers. | CONTPT | 140 |
| Buffer pool is fetched protected. | FTCHPR | YES |
| Buffer pool attributes. | FIXPGE | FIXED |
| Buffer pool subpool. | SBPOOL | 231 |

Private: Pct of total 100% Residual: Pct of total 0%
Beginning address... 07D68000 Beginning address... 00000000
Ending address... 07D85000 Ending address... 00000000
Number of buffers... 442 Number of buffers... 0

---

Figure 40. CRPL Buffer Pool Start Options
**Detecting Allocation Problems**

You want to tune VTAM so that the initial number of buffers (BASENO) in the pool is set to a level that manages storage efficiently. This means avoiding over- and under-allocation of BASENO.

You can use trending data from the Buffer Pool Statistics display to determine the average number of buffers used over time. See “Tuning a Buffer Pool with Trending Data” on page 102, later in this chapter.

The Buffer Pool Statistics display, as shown below, provides real-time data on the buffer pool. It includes statistics to help you calculate how efficiently the buffers are currently being used. Also, a graphic display of the buffer pool's condition indicates whether the buffer pool is in slowdown, expansion, normal, or contraction mode.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total buffers in pool</td>
<td>436</td>
<td>Base allocation</td>
<td>436</td>
</tr>
<tr>
<td>Buffers in use</td>
<td>138</td>
<td>Max buffers in pool</td>
<td>436</td>
</tr>
<tr>
<td>Buffers available</td>
<td>298</td>
<td>Max buffers used</td>
<td>415</td>
</tr>
<tr>
<td>Buffers over slowdown</td>
<td>293</td>
<td>Dynamic expansion</td>
<td>ON</td>
</tr>
<tr>
<td>Buffers over expansion</td>
<td>292</td>
<td>Number of active extents</td>
<td>0</td>
</tr>
<tr>
<td>Storage requests queued</td>
<td>0</td>
<td>Times expanded</td>
<td>0</td>
</tr>
</tbody>
</table>

**Buffer Pool Condition**

<table>
<thead>
<tr>
<th>Slowdown</th>
<th>Expansion</th>
<th>Normal</th>
<th>Contraction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Command ===>

F1=Help F2=Keys F3=Exit F5=Refresh F6=Console F9=Retrieve F10=Action Bar
F11=Print F12=Cancel F15=Status_Display

![Buffer Pool Statistics Display](image)

**Figure 41. Buffer Pool Statistics Display**

Begin by checking the Times Expanded value and the Dynamic Expansion flag. If Dynamic Expansion is set to ON, examine the Times Expanded field. If this field is 0, the pool has not expanded. This may mean that the base allocation is too large.
In this case, you can roughly calculate the amount of storage wasted (if any) as follows:

1. Subtract the number of buffers used, **Max buffers used**, from **Max buffers in pool**.
2. Multiply that result by the size of the buffer (examine the **Actual size** field from the Start Options display).

If **Max buffers used** is significantly less than **Max buffers in pool**, you may want to reduce the Base Allocation (BASENO) accordingly.

**Thrashing**

An important reason for tuning VTAM is to prevent a buffer pool from thrashing. Thrashing occurs when dynamic requests for buffers are excessive, causing an abnormally high rate of expansion and contraction in a buffer pool and a subsequent drain of CPU resources. Thrashing affects users local to VTAM, because requests for storage must be queued when VTAM expands a buffer pool.

You can detect thrashing by observing the **Times expanded** value on the Buffer Pool Statistics display as in the previous figure. If this value changes appreciably in a short span of time, then thrashing is occurring.

OMEGAMON II determines that thrashing is occurring for a given pool and generates an exception when the number of buffers obtained due to expansion greatly exceeds the total number of buffers in the pool. OMEGAMON II indicates thrashing if the following ratio is greater than five:

\[
\text{RATIO} = \frac{(\text{NUMEXP} \times \text{XPANNO})}{\text{TOTBUF}}
\]

- \text{NUMEXP} \quad \text{Current sample's number of expansions.}
- \text{XPANNO} \quad \text{Number of buffers allocated when VTAM expands the pool.}
- \text{(NUMEXP} \times \text{XPANNO}) \quad \text{Number of buffers obtained due to expansion during the current sampling.}
- \text{TOTBUF} \quad \text{Total number of buffers currently in the pool.}
There are two ways to prevent thrashing:

1. Increase the initial allocation for the pool (BASENO). This method is recommended if you have ECSA available.

2. Increase the expansion increment (XPANNO) to a value large enough to give VTAM an additional page of buffers during expansion. This inhibits premature contraction of the buffer pool. Remember that the contraction formula is twice the expansion increment plus the expansion point. In addition, VTAM rounds your expansion increment up to full pages.

Also, you should make sure that the value XPANPT minus SLOWPT is greater than the largest single request for storage. Otherwise, a buffer pool can move from normal to slowdown mode with one request for storage. See the case study at the end of the chapter for a step-by-step analysis of using OMEGAMON II to detect and correct buffer pool thrashing.

Tuning a Buffer Pool with Trending Data

To tune a buffer pool properly, you need to examine buffer usage trends over a period of time. For example, you may want to check how many buffers, on average, are being used at regular intervals over the course of a day.

The Buffer Usage Trend display shows you such data. At the Statistics display, as in the previous figure, select Trends from the Goto pull-down. You receive a second pull-down asking for the type of trending data you want displayed:

1. Total buffers in pool
2. Buffers in use
3. Buffers available
4. Number of active extents
5. Times expanded
6. Storage requests queued

The Buffers in use and Times expanded options are the most useful for tuning a buffer pool. Both provide historical data on the usage of a pool and its expansion/contraction behavior over a period of time.

If you select Times expanded, you see a screen similar to the one shown in the following figure. The first two columns list the date and time, with each specifying a time interval. This is the start of the interval. The third column displays the number of expansions. The fourth and fifth columns show a percentage and graphic equivalent for the information, respectively.
Figure 42. Trend Display for Number of CRPL Buffer Pool Expansions

The graphic part of the display is a useful visual tool for detecting the presence of thrashing. You might suspect thrashing if high values are shown.

**Historical Reports**

If you have SAS/GRAPH installed and SMF recording enabled for buffer pool data (see “Buffer Pool Monitor Options” on page 315), you can use OMEGAMON II to display color historical graphs of the following types of buffer pool information:

- Analysis of buffer usage
- Total buffers vs. buffers obtained through expansion (thrashing indicator)
- IO00 buffer usage by category
- CRPL buffer usage by address space type
- CRPL buffer analysis

See the information about SAS reporting in the *OMEGAMON II for VTAM Historical Reporting Guide* for instructions on how to use this feature.
**IO00 Buffer Pool Usage by Category**

On the Buffer Pools Status display, you can enter action code G (Categories) next to IO00. The Use by User Category panel breaks down IO00 buffer pool usage by user category. You can view what percentages of a buffer pool are being allocated for read channel programs, SSCP traffic, application PLUs to various network resources, as shown in the following figure.

<table>
<thead>
<tr>
<th>Description</th>
<th>Pct</th>
<th>/zerodot/zerodot...</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unallocated buffers.</strong></td>
<td>33.7%</td>
<td>======&gt;. . . . . .</td>
</tr>
<tr>
<td><strong>Read Channel Programs.</strong></td>
<td>40.9%</td>
<td>========&gt;. . . . .</td>
</tr>
<tr>
<td><strong>Misc</strong></td>
<td>11.4%</td>
<td>==&gt;. . . . . . . .</td>
</tr>
<tr>
<td><strong>TSCBs.</strong></td>
<td>42.3%</td>
<td>========&gt;. . . . .</td>
</tr>
<tr>
<td><strong>SSCP Traffic</strong></td>
<td>0%</td>
<td>&gt;. . . . . . . . .</td>
</tr>
<tr>
<td><strong>Virtual route pacing response traffic.</strong></td>
<td>0%</td>
<td>&gt;. . . . . . . . .</td>
</tr>
<tr>
<td><strong>APPL (PLU) to same subarea resource.</strong></td>
<td>48.8%</td>
<td>==========&gt;. . . .</td>
</tr>
<tr>
<td><strong>APPL (PLU) to different sa resource.</strong></td>
<td>51.2%</td>
<td>==========&gt;. . . .</td>
</tr>
<tr>
<td><strong>APPL (SLU) to different sa resource.</strong></td>
<td>0%</td>
<td>&gt;. . . . . . . . .</td>
</tr>
<tr>
<td><strong>Local SNA to different subarea APPL.</strong></td>
<td>0%</td>
<td>&gt;. . . . . . . . .</td>
</tr>
<tr>
<td><strong>Local non-SNA to different sa APPL.</strong></td>
<td>0%</td>
<td>&gt;. . . . . . . . .</td>
</tr>
<tr>
<td><strong>Intermediate Routing Node Traffic.</strong></td>
<td>0%</td>
<td>&gt;. . . . . . . . .</td>
</tr>
</tbody>
</table>

---

**Figure 43. IO00 Usage by User Category**
On the Buffer Pool Status display, you can enter action code U next to IO00 or CRPL. For the IO00 or CRPL buffer pool, usage information is provided for each address space as shown in the following figure. This information can help you ascertain the nature of the network traffic and users of VTAM resources, as well as detect unusually high demand for buffers or patterns indicative of network congestion.

![Figure 44. IO00 Usage by Address Space](image)

For each address space, this panel lists the following:

**Addr Space**  Name of address space that currently has buffers allocated in the pool. An address space can be a batch job, started task, or TSO user.

**Buffers**  Number of buffers allocated by the address space. This value is displayed as an absolute number.

**Percent**  Buffers for the address space as a percentage of the total number of buffers in the pool.

This panel can help you determine which address spaces are major consumers of IO00 or CRPL buffer resources. However, due to the highly transient nature of IO00 buffers, the IO00 display is most useful during periods of network congestion when TSCBs may be queued for long periods of time in the IO00 pool.
On the IO00 Usage by Address Space display, you can select an address space with action code S (Show Applids). The IO00 Usage for Address Space appears.

For each applid, this panel lists the following:

**Applid** Application LU name that appears on either the origin or destination element within the buffers currently in use by the address space.

**Buffers** Number of buffers in which the application appears. This value is determined from the PIU within each IO00 buffer and is displayed as an absolute number.

**Percent** Percentage of buffers for the application out of the total number of buffers currently in use by the address space.

This panel can help you determine which of many application LUs are major consumers of IO00 buffer pool space.

Action code S (Resource Analysis) takes you to resource analysis for the selected applid.
Buffer Pool Extents

You can enter action code E (Extents) next to any pool on the Buffer Pools Status display. The Buffer Pool Extents, as in the following figure, shows you the status, address, and usage of each extent of buffers in the selected buffer pool.

<table>
<thead>
<tr>
<th>Ext</th>
<th>Status</th>
<th>Start Address</th>
<th>Ext Blk Address</th>
<th>Free Buffers</th>
<th>Pct</th>
<th>Percent Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ACTIVE</td>
<td>03288000</td>
<td>03716FE8</td>
<td>0</td>
<td>100.0%</td>
<td>==============&gt;</td>
</tr>
<tr>
<td>2</td>
<td>ACTIVE</td>
<td>03208000</td>
<td>036B0048</td>
<td>0</td>
<td>100.0%</td>
<td>==============&gt;</td>
</tr>
<tr>
<td>3</td>
<td>ACTIVE</td>
<td>03200000</td>
<td>036B0030</td>
<td>1</td>
<td>98.9%</td>
<td>==============&gt;</td>
</tr>
<tr>
<td>4</td>
<td>ACTIVE</td>
<td>03180000</td>
<td>036B0030</td>
<td>0</td>
<td>100.0%</td>
<td>==============&gt;</td>
</tr>
<tr>
<td>5</td>
<td>ACTIVE</td>
<td>0312A000</td>
<td>036B0340</td>
<td>60</td>
<td>33.3%</td>
<td>==============&gt;</td>
</tr>
<tr>
<td>6</td>
<td>ACTIVE</td>
<td>03120000</td>
<td>03643050</td>
<td>0</td>
<td>100.0%</td>
<td>==============&gt;</td>
</tr>
<tr>
<td>7</td>
<td>INACT</td>
<td>00000000</td>
<td>03643008</td>
<td>89</td>
<td>1.1%</td>
<td>==============&gt;</td>
</tr>
</tbody>
</table>

Figure 46. Buffer Pool Extents for CRPL

The Extents panel is useful for investigating wasted storage, especially for fixed storage buffer pools like IO00. The reason is that active buffers may be randomly distributed throughout an extent, creating a situation where the unused portion is tied up. In an installation with a large amount of central storage, such fragmentation could affect system performance. The Extents panel helps you to determine if such a problem is occurring and, if so, in which extents the fragmentation exists.
Case Study: Recognizing and Correcting Thrashing

The following set of panels and data illustrates a typical buffer pool problem, and demonstrates how to solve it by correcting the VTAM startup parameter values.

Initial Approach

We begin by looking for exception messages; in particular, thrashing exceptions. Suppose we find one for the CRPL buffer pool. A useful approach is to first examine buffer pool usage trends for CRPL. This provides data on the number of buffer pool expansions and contractions, and available buffers over the course of a day.

Sequence of Actions

We begin by entering action code S (for Statistics) next to CRPL on the Buffer Pools Status Display. This navigates to the Buffer Pool Statistics panel. From that panel, we select Trends from the Goto pull-down, and then Times Expanded from the pop-up that follows.

The Trend for Times Expanded panel shows us the number of expansions of a buffer pool over a specified time interval. For example, the following figure indicates high values for the last two collection periods, suggesting that thrashing is occurring in this pool.
The highest number of expansions for the collection period was 363.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Expans</th>
<th>Percent</th>
<th>0.10.20.30.40.50.60.70.80.90.100</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/10/93</td>
<td>11:42:32</td>
<td>363</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>11:27:24</td>
<td>310</td>
<td>85.3%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>11:11:54</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>10:56:38</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>10:41:20</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>10:26:04</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>10:10:57</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>09:55:55</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>09:40:56</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>09:25:40</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
<tr>
<td>10/10/93</td>
<td>09:10:24</td>
<td>0</td>
<td>0.0%</td>
<td></td>
</tr>
</tbody>
</table>

**Examining Usage by Address Space**

The next step in this process might be to use the Usage action code for CRPL. This would provide information on whether any particular address space is holding many CRPL buffers.

We must navigate back to the Buffer Pools Status Display by repeatedly pressing F12. Then, we enter U (for Usage) next to CRPL. The CRPL Usage by Address Space panel appears.
We want to locate any address spaces that are holding an abnormally high number of buffers. Notice that in the first row, the address space held by user HOOG310A is using almost 50 percent of the buffers. That leads us to suspect that this user might be contributing to or aggravating the problem. Later, we confirm the hypothesis upon learning that HOOG310A has been using a file transfer program. If the buffer pool is not tuned properly, a file transfer program may cause it to expand and contract excessively, since the data is often transferred in bursts.
Effecting tuning decisions involve optimizing the VTAM startup parameter values. We need to examine the current ones and calculate a more efficient set.

From the Buffer Pools Status Display, enter action code 0 (for Start Options) next to CRPL. The Buffer Pool Start Options display for CRPL appears.

From this panel, we can extract the following values:

- **Base allocation (BASENO)**: 192
- **Slowpoint (SLOWPT)**: 3
- **Expansion number (XPANNO)**: 90
- **Expansion point (XPANPT)**: 4
- **Contraction Point (CONTPT)**: 184

We can interpret this data as follows: CRPL starts with a base allocation of 192 buffers. When all but 4 buffers from this base allocation are used, CRPL expands in an increment of 90 buffers over the base allocation, for a total of 282 buffers. This represents CRPL's first expansion. Subsequently, CRPL expands by the same amount each time all but 4 buffers remain unused.

The suggestions outlined below consider the startup parameter values for this example, as well as their relationships to each other.
**SLOWPT:** When examining the startup parameters, you should first check to see if SLOWPT is large enough to handle priority requests. Generally, for CRPL and IO00, a value of 5 to 8 buffers is sufficient. In Figure 49, SLOWPT is set at 3. It would be prudent to raise the value to around 6 to ensure that priority requests for buffers are not queued.

**Correcting the Expansion Number (XPANNO):** We ascertained from the Usage Trends display that expansion and contraction of CRPL are occurring at a high rate. Raising the value of XPANNO may help eliminate the problem, since fewer expansions of CRPL will be needed. Since the contraction point is correlated with XPANNO (contraction point = (2 * XPANNO) + XPANPT), increasing XPANNO also increases the contraction point, making CRPL less likely to contract. This should help reduce thrashing in CRPL. To decide how much of an increase is optimal is something of a trial and error process. If OMEGAMON indicates that thrashing is severe, we may start by increasing XPANNO by a factor of at least two. In this example, we might begin by doubling the value of XPANNO to 180.

**Checking the Base Allocation (BASENO):** Another step in the buffer pool tuning process is setting the optimal base allocation (BASENO). To do this, we can use the Trend for Buffers in Use display to view the average number of buffers in use over the course of a day (see the following figure). Then, we want to select a value greater than the number used during some given percentage of the time; for example, 50 percent.

Viewing this figure, we estimate that the average number of CRPL buffers used over the course of a day is around 400. Based on that information, we will change our base allocation to 420, which should be slightly over the 50 percent usage value.
Implementing the Changes

When our buffer pool tuning calculations are finished, we need to implement the changes in the VTAM start options parameters. To do this, we must exit from OMEGAMON II, change the VTAM start option parameter values for CRPL, and restart VTAM. Next, we would let the system and OMEGAMON II run for a while before using OMEGAMON II again to compare the new values of Trends and Usage by Address Space. In this fashion, we can determine whether:

- Thrashing in CRPL still exists, and XPANNO and BASENO require further adjustments.
- The CRPL buffer pool is expanding and contracting in a manner that indicates efficient use of storage.
- The adjustments to XPANNO and BASENO were too great (few or no expansions and contractions are occurring), indicating that smaller values should be used.
CRPL Buffer Pool Trending Navigation

Chapter 6. Buffer Pool Analysis 115
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>118</td>
</tr>
<tr>
<td>Virtual Routes and Explicit Routes</td>
<td>118</td>
</tr>
<tr>
<td>Virtual Route Pacing</td>
<td>119</td>
</tr>
<tr>
<td>Virtual Route States</td>
<td>121</td>
</tr>
<tr>
<td>How to Obtain Virtual Route Information</td>
<td>122</td>
</tr>
<tr>
<td>How to Interpret Virtual Route Information</td>
<td>123</td>
</tr>
<tr>
<td>Virtual Route Status</td>
<td>124</td>
</tr>
<tr>
<td>MAP 0100: Interpreting Virtual Route Information</td>
<td>125</td>
</tr>
<tr>
<td>Resource Analysis</td>
<td>126</td>
</tr>
<tr>
<td>How to Tune Virtual Routes</td>
<td>126</td>
</tr>
<tr>
<td>Specifying Path Definitions</td>
<td>126</td>
</tr>
<tr>
<td>Recommended Window Sizes</td>
<td>127</td>
</tr>
<tr>
<td>Creating and Modifying a Class-of-Service Table</td>
<td>128</td>
</tr>
<tr>
<td>Virtual Route Response Times</td>
<td>129</td>
</tr>
<tr>
<td>Number of Hops</td>
<td>131</td>
</tr>
<tr>
<td>Virtual Route Trends</td>
<td>132</td>
</tr>
<tr>
<td>Virtual Route State Trending</td>
<td>132</td>
</tr>
<tr>
<td>Pacing Window Size Trending</td>
<td>134</td>
</tr>
<tr>
<td>Message Traffic Trending</td>
<td>135</td>
</tr>
<tr>
<td>Session Distribution Trending</td>
<td>136</td>
</tr>
<tr>
<td>Case Study: Blocked Virtual Route</td>
<td>137</td>
</tr>
<tr>
<td>Historical Reports</td>
<td>138</td>
</tr>
<tr>
<td>For Further VR Information</td>
<td>138</td>
</tr>
<tr>
<td>Virtual Routes Component Navigation</td>
<td>139</td>
</tr>
<tr>
<td>Virtual Route Trending Navigation</td>
<td>140</td>
</tr>
</tbody>
</table>
Overview

VTAM uses virtual routes to control data flow in the network. All session traffic flows over virtual routes, which are mapped to physical, or explicit, routes.

OMEGAMON II shows the mapping between virtual and explicit routes, monitors the flow of data on each route, and provides information to help you tune the network flow control mechanisms. To tune virtual routes, you can:

- change route definitions to produce a more efficient flow of data in the network
- distribute session traffic more evenly among the routes you have defined
- adjust virtual route pacing values to obtain maximum throughput

This chapter explains virtual routes and tells you how to use OMEGAMON II displays to tune them.

Virtual Routes and Explicit Routes

A virtual route is a logical connection between two subarea nodes in a network. A subarea node can be a VTAM or an NCP.

In the VTAMLST dataset, a path definition statement identifies each virtual route by:

- address of the subarea node at the end of the route (that is, the destination subarea)
- virtual route number from 0—7, which is the same in both directions
- explicit route number from 0—15

Traffic from an individual session is assigned to only one virtual route, but each virtual route can carry traffic from many sessions. At session activation, VTAM uses an entry in the class-of-service table to assign the session to a virtual route. If no class-of-service table entry exists for the session, VTAM uses a list of IBM-specified defaults.
If two virtual routes have the same virtual route number but different transmission priority numbers, VTAM considers them to be two separate virtual routes. Thus, there can be a maximum of 24 virtual routes between any two subarea nodes in the network:

\[
8 \text{ virtual route numbers} \times 3 \text{ transmission priority numbers}
\]

Path definition statements in the VTAMLST dataset map virtual routes to explicit routes. You can change the routing of an application's data traffic either by modifying the path definition statement or by modifying the class-of-service table.

**Virtual Route Pacing**

Virtual route pacing is an SNA network's principal technique for controlling data flow globally. A *pacing window* is a group of Path Information Units (PIUs); that is, messages flowing through the network. *Pacing window size* is the number of PIUs in the group. Path definition statements can set minimum and maximum window sizes for each virtual route, or the minimum and maximum window sizes can default to values set by IBM. The actual, or *current*, window size fluctuates in the range set by the minimum and maximum values.

When a virtual route is initialized, the current window size is set at the minimum. The first PIU of each window contains a virtual route pacing request (VRPRQ). If there is no congestion in the network when the pacing request arrives, the receiving node returns a virtual route pacing response (VRPRS), a special PIU that contains no data and flows at network priority. Once the sending node receives the VRPRS, it can send another window of data.

If the VRPRS returns *before* the sender has transmitted an entire window of data, the window size remains the same; the VRPRS has not slowed network traffic, so there is no need to increase the window size. If, however, the VRPRS returns *after* the sender has transmitted an entire window, the window size increases by 1 (assuming the maximum window size has not been reached). These actions are performed independently and asynchronously for traffic originating at the two ends of the virtual route, and window sizes in the two directions may not be the same.
The following figure shows an example of flow control through virtual route pacing. In this example, assume that the minimum window size was set to 3, and the maximum was set to 9. Because the initial window size is 3, the sending node transmits 3 PIUs, the first of which contains a VRPRQ (a). When the VRPRQ arrives, the receiving node transmits an VRPRS. The VRPRS arrives before the sending node has transmitted the last PIU in the three-PIU window (b). Thus, the window size remains 3, and the sending node can transmit another window of 3 PIUs. This time, however, the sending node transmits all 3 PIUs before the VRPRS arrives (c). Therefore, the window size now increases to 4.

VTAM and NCP monitor their local resources (CPU, buffers, and so on) to check for congestion; that is, lessened availability of resources. When it detects congestion, VTAM reduces the window size to keep excessive data traffic from overloading the network's resources. If the congestion is moderate, the window size decreases by 1. If the congestion is severe, the window size is immediately reset to the minimum.
Virtual Route States

A virtual route that is carrying traffic or has sessions assigned to it is called an active virtual route. An active virtual route can be in any of three states:

**Open**  
When data traffic is flowing without delay.

**Held**  
When the sender has transmitted a window of data and is waiting for a pacing response before transmitting more data.

**Blocked**  
When the sender has transmitted a window of data, is waiting for a pacing response, and has a full window of PIUs queued for transmission.

The origin subarea node for traffic in each direction monitors the virtual route state. NCP does not have a blocked state and does not recognize VTAM's distinction between held and blocked states.

Virtual routes can enter the held state frequently in the normal course of operation, particularly if they are mapped to explicit routes that pass through more than one subarea node between origin and destination. In such a network, the slowest transmission group link becomes a bottleneck.

For example, the following figure shows a route in which the two transmission groups have different capacities. The link between Node B and Node C is the bottleneck link. We can expect the virtual route between A and B to enter the held state frequently while waiting for B to finish transmitting data to C.

![Figure 52. Transmission Group Links with Different Capacities](image)

Because the slowest link governs the speed of data traffic on an entire explicit route, a frequent held state and even an occasional blocked state may be normal. In this situation, increasing the window size does no good and may overload the intermediate node's buffers.

When a virtual route is blocked, VTAM withholds all input to the route. If the blocked state lasts for a long time, throughput and response time in the entire network suffers.

Similarly, NCP withholds input to held virtual routes. Therefore, a persistent held state can cause network congestion, even if the held state results from normal operation.
How to Obtain Virtual Route Information

To obtain virtual route information, select **Virtual Routes** from the main status panel. The Virtual Route Analysis panel appears.

```
  ________ Actions  Goto  View  Options  Help
  ---------------------------------------------------------------
  KONDVMND  Virtual Route Analysis
  Subareas Defined from CCCDRM01 (Subarea 1)

Select with a "/" or an action code.
  X=Exceptions  S=VR status  M=ER mapping  R=PIU rates  D=LU distribution

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Destination</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>_ 2</td>
<td>CCCDRM02</td>
<td>Warning</td>
</tr>
<tr>
<td>_ 1</td>
<td>CCCDRM01</td>
<td>Normal</td>
</tr>
<tr>
<td>_ 4</td>
<td>CCCDRM04</td>
<td>Normal</td>
</tr>
<tr>
<td>_ 5</td>
<td>NCP05</td>
<td>Normal</td>
</tr>
<tr>
<td>_ 6</td>
<td>NCP06</td>
<td>Normal</td>
</tr>
<tr>
<td>_ 7</td>
<td>NCP07</td>
<td>Normal</td>
</tr>
<tr>
<td>_ 8</td>
<td>NCP08</td>
<td>Normal</td>
</tr>
<tr>
<td>_ 9</td>
<td>NCP09</td>
<td>Normal</td>
</tr>
<tr>
<td>_ 10</td>
<td>NCP10</td>
<td>Normal</td>
</tr>
</tbody>
</table>
```

Command ===>
F1=Help  F2=Keys  F3=Exit  F5=Refresh  F6=Console  **=Bkwd  **=Fwd  F9=Retrieve
F10=Action Bar  F11=Print  F12=Cancel  F14=Find  F15=Status_Display

Figure 53. Virtual Route Analysis Panel

The Monitor List, under Virtual Route Monitoring Options on the Options pull-down, controls which subareas and virtual routes are monitored and displayed. From the Virtual Route Analysis panel, you can use these actions:

**Exceptions**  Lists exceptions for virtual routes to the destination subarea.

**VR status**  Tells whether each virtual route (VR) is active or inactive, and gives information about pacing window size and state (open, held, or blocked).

**ER mapping**  Shows the explicit route (ER) for each virtual route, and identifies the adjacent subarea on the route.

**PIU rates**  Gives the number and percentage of PIUs per second, outbound and inbound, on each virtual route.

**LU distribution**  Graphs the number of logical-unit-to-logical-unit (LU-LU) sessions over virtual routes.
How to Interpret Virtual Route Information

If all the status lights are green (normal) on the Virtual Route Analysis panel, all the active routes in your network are open. If any light is yellow (warning) or red (critical), you can isolate the problem area by entering X (for Exceptions) to its left. A list of exceptions for virtual routes to the destination subarea appears. You can then use the Goto selection on the action bar to obtain more specific information.

“MAP 0100: Interpreting Virtual Route Information” on page 125 shows the sequence of steps to follow in interpreting virtual route information. You need to be able to answer three questions:

1. Is the virtual route open?
2. Is the window size at maximum?
3. Is the window size increasing?

For the answers to those questions, follow these steps to navigate to the Virtual Route Status panel:

1. On the main status panel, enter $ (for Show next panel) to the left of Virtual Routes.

   The Virtual Route Analysis panel appears. This panel lists the destination subareas for all virtual routes that have been defined to the VTAM you are monitoring.

2. Enter $ (for VR status) to the left of the subarea that is the destination of the virtual route you want to investigate.
Virtual Route Status

The Virtual Route Status panel, as shown below, lists information separately for each virtual route number and transmission priority number.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Goto</th>
<th>Options</th>
<th>Help</th>
</tr>
</thead>
<tbody>
<tr>
<td>KONDVVRD</td>
<td>Virtual Route Status</td>
<td>More:</td>
<td></td>
</tr>
<tr>
<td>for VRs from CCCDRM01 (1) to CCCDRM02 (2)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Select one or more with a "/" or an action code.
S=Session partners

<table>
<thead>
<tr>
<th>VR Status</th>
<th>TP Status</th>
<th>Pacing Window</th>
</tr>
</thead>
<tbody>
<tr>
<td># Status</td>
<td># Status</td>
<td>Curr Min Max Status Condition</td>
</tr>
<tr>
<td>-----------</td>
<td>------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>_ /zerodot</td>
<td>ACTIVE</td>
<td>_ /zerodot</td>
</tr>
<tr>
<td>1</td>
<td>ACTIVE</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>ACTIVE</td>
<td>44</td>
</tr>
</tbody>
</table>

Command ===>
F1=Help F2=Keys F3=Exit F5=Refresh F6=Console **=Bkwd **=Fwd F9=Retrieve
F10=Action Bar F11=Print F12=Cancel F15=Status_Display

Figure 54. Virtual Route Status Panel

If the virtual route that interests you is active, check the pacing window information in the right half of the display. The Status column under Pacing Window shows whether the virtual route is open, held, or blocked.

Now you need to find out whether the window size is at maximum. Compare the current pacing window size (Curr column) with the maximum window size (Max column).

To determine whether the window size is increasing, watch the Curr column for a few minutes. Press F5 frequently to refresh the panel. If the number in the Curr column increases, the window size is increasing.

You might also need long-term answers to the three questions. For example, if a virtual route is usually open but is consistently blocked at a certain time of day, examining the real-time Virtual Route Status panel does not give you all the information you need. To get an accurate picture of overall virtual route performance, you can examine the trending data and SAS-based historical graphs that OMEGAMON II provides. See “Virtual Route Trends” on page 132, “Historical Reports” on page 138, and “Case Study: Blocked Virtual Route” on page 137.
001
Is the virtual route open?
Yes No

002
Is the window size at maximum?
Yes No

003
Is the window size increasing?
Yes No

004
There is congestion in the network.

Continue at “How to Tune Virtual Routes” on page 126.

005
Monitor the situation for change.

006
At least one of these is true:

- The maximum window size is too small.
- Too many sessions are using the same route.
- One or more sessions are sending large amounts of data.

Continue at “How to Tune Virtual Routes” on page 126.

007
The virtual route is fine.
Resource Analysis

The resource analysis feature is available from Virtual Routes using the following steps:

1. Select Virtual Routes from the main status panel.
2. Enter action code $ next to a subarea in the action code entry field.
3. Enter action code $ (Session Partners) next to the VR number in the action code entry field.
4. Enter action code $ (Resource Analysis) next to a resource.

Result: Depending on the type of resource selected, a resource analysis panel appears. See “Resource Analysis” on page 77.

How to Tune Virtual Routes

Depending on your answers to the questions in “MAP 0100: Interpreting Virtual Route Information” on page 125, you might need to take action to improve virtual route performance. The easiest and least drastic remedies to try are:

- changing the maximum window size
- mapping the virtual route to a different explicit route
- changing the class-of-service table to distribute sessions more evenly among the virtual routes

If these measures do not help, you may have a hardware problem. One or more transmission group links may be extremely slow, the order of the links in the transmission group may be wrong, or a network component may be defective.

Assuming that you do not have a hardware problem, you can tune the virtual routes in your network by modifying either the path definitions in the VTAMLST dataset or the class-of-service table in the VTAM load module library.

Specifying Path Definitions

A PATH statement:
- specifies the destination subarea
- assigns each virtual route to an explicit route
• optionally, gives a default minimum and maximum pacing window size for each virtual route

The IBM manual *VTAM Installation and Resource Definition* provides instructions for coding the PATH statement. Here is an example of a PATH statement:

```
PATH DESTSA=2, ER6=2, VR3=6, VRPWS30=(15,255)
```

- **DESTSA=2** Indicates that the destination subarea is subarea 2.
- **ER6=2** Establishes subarea 2 as the adjacent subarea on explicit route 6.
- **VR3=6** Maps virtual route 3 to explicit route 6.
- **VRPWS30=(15,255)** Sets 15 as the minimum window size and 255 as the maximum window size for virtual route 3 with transmission priority 0. (The first numeric character in VRPWSnn indicates the virtual route number, and the second numeric character indicates the transmission priority number.)

To change the maximum window size of a virtual route, you modify the PATH statement. Or if you discover that too many virtual routes are mapped to the same explicit route, you can change the mapping in the PATH statement. In addition, when you add or change hardware, you may need to change the explicit route definitions.

### Recommended Window Sizes

By default, the *minimum* window size is the number of transmission groups in the explicit route to which the virtual route is mapped; the default *maximum* window size is three times that number. However, if the virtual route ends in an adjacent subarea, then the default maximum window size is the larger of:

- 15

or

- \(255 - (16 \times n)\)

where \(n\) is the number of explicit routes that pass through the adjacent subarea but do not end there. Thus, in a simple two subarea network, the default minimum window size is 1 and the default maximum window size is 255, since all explicit routes end at the adjacent subarea.
If your network has virtual route problems, you might want to increase the maximum window size. If the problems persist, increase the maximum again. A maximum window size that is set too low can cause significant virtual route problems, and the default value is too low for many networks.

You might also want to modify the minimum window size for VTAM channel-to-channel virtual routes. VTAM increases the window size only when the virtual route enters the held state; that is, when the sender is waiting for a virtual route pacing response before transmitting more data. Channel-to-channel routes are so fast that the virtual route may never enter the held state, and the window size may never increase from the minimum. When the window size is small, many virtual route pacing responses flow over the channel. The result can be an unnecessarily high amount of traffic and CPU usage.

Therefore, the IBM VTAM Customization manual recommends that you increase the minimum window size to 15 for single-link channel-to-channel routes. (The default minimum window size for such a route is 1.)

Creating and Modifying a Class-of-Service Table

You can use a class-of-service table to group together virtual routes with similar characteristics, such as security and transmission priority. For example, you can put the fast routes in a list intended for interactive sessions and the slow routes in another list intended for batch jobs.

A class-of-service table gives each list, or entry, a class-of-service name, which can then be associated with a session's logon mode. When VTAM establishes a session, it chooses the first available route from the list of routes for that session's class of service.

If no class-of-service table exists, VTAM uses a list of IBM-specified default routes. This default list may not suit your network. For example, the default list could result in an interactive session being assigned to a slow line, or in too many sessions being assigned to the same virtual route. The IBM VTAM Customization manual gives detailed instructions for creating a class-of-service table.

Once you have created a class-of-service table, you can use OMEGAMON II to see whether the flow of traffic on your network's virtual routes seems to be balanced. If not, you might want to change the list of routes in each class of service.
Virtual Route Response Times

Because virtual route problems often manifest themselves as response time problems, OMEGAMON II provides a summary of terminal response times by virtual route. To view the response time summary, follow these steps.

1. On the main status panel, enter $S$ to the left of Response Times.

   The Terminal Response Time panel appears.

2. Select Goto from the action bar and then select Subarea Summary.

   The Response Time Summary by Subarea appears as shown below.

3. Enter $S$ to the left of the destination subarea that interests you. (In the example, we chose CCCDRM02, the subarea with the highest network response time.)
The Response Time Summary by VR appears as shown below. This panel displays average host, network, and total response times for each virtual route at each transmission priority.

<table>
<thead>
<tr>
<th>VR</th>
<th>ER</th>
<th>RER</th>
<th>TP</th>
<th>LUs</th>
<th>PIUs</th>
<th>Host</th>
<th>Netwrk</th>
<th>Total</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>7</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.0s</td>
<td>0.0s</td>
<td>0.0s</td>
<td>Idle</td>
</tr>
<tr>
<td>1</td>
<td>14</td>
<td>44</td>
<td>1.1s</td>
<td>1.2s</td>
<td>2.3s</td>
<td>Critical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0.0s</td>
<td>0.0s</td>
<td>0.0s</td>
<td></td>
<td>Idle</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 56. Response Time Summary by Virtual Route**

In this panel, all sessions that use Virtual Route 0 to Subarea 2 are assigned to Transmission Priority 1. Response time might improve if some sessions used Transmission Priority 0 or if some sessions used a different virtual route.
Number of Hops

When you select the Virtual Routes component on the main status panel, the Virtual Route Analysis panel appears. The panel shows the destination subareas known to this host subarea and uses a status light to indicate the condition of the virtual routes between the subareas.

Then, if you enter action code M (ER Mapping) next to a subarea of interest, the Explicit Route Mapping panel appears.

<table>
<thead>
<tr>
<th>#</th>
<th>Status</th>
<th>#</th>
<th>Status</th>
<th>Adjacent Subarea</th>
<th>#</th>
<th>Hops</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>_</td>
<td>/zerodot</td>
<td>ACTIVE</td>
<td>4</td>
<td>ACTIVE3</td>
<td>1</td>
<td>CCCDRM/zerodot1</td>
<td>2</td>
</tr>
<tr>
<td>_</td>
<td>1</td>
<td>INACT</td>
<td>1</td>
<td>INACT</td>
<td>1/zerodot</td>
<td>NCP1/zerodot</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 57. Explicit Route Mapping Panel**

This panel shows the virtual route to explicit route assignments for all VRs defined between the two subareas specified in the panel title.

Notice the # Hops column to the right of the Adjacent Subarea column. The number of hops is the number of subareas in a virtual route through which data must travel until it reaches its destination. Only hops in this network are counted. An asterisk (*) in the # Hops field indicates that the virtual route is not in active status.

To improve application response times in a large complex network, you may decide to redirect sessions over different VRs via the class of service table (COSTABLE).
Virtual Route Trends

Many virtual route tuning and configuration decisions require not only real-time data, but also data collected over a longer period of time. To give you the long-term information you need, OMEGAMON II provides online trend displays. Virtual route trend information is available for:

- virtual route state (open, held, or blocked)
- pacing window size
- message traffic
- session distribution

Virtual Route State Trending

To view virtual route state trending information, follow these steps.

1. On the Virtual Route Analysis panel, enter **S** (for VR Status) to the left of the subarea that is the destination of the virtual route you want to examine.

2. On the Virtual Route Status panel, enter **gt** (for Goto Trending) in the action bar entry field.

3. On the VR Trending pop-up window, identify the virtual route that interests you by typing its VR number and TP number (see the figure below). Select **VR status** in the bottom section of the pop-up, and press Enter.

```
+------------------------------------+
| KONDVTPD VR Trending               |
| Enter a VR and a TP number.        |
| VR . . 0  (0-7)                    |
| TP . . 1  (0-2)                    |
| Select a choice by number, by mnemonic, or with the cursor. |
| 1. VR status (S)                   |
| 2. Average window size (W)         |
| F1=Help  F12=Cancel                |
+------------------------------------+
```

Figure 58. Virtual Route Trending Selection Window
The VR Status Trending panel appears as in the figure below. This display shows the percent of time during each trending interval that the virtual route was open, held, and blocked. The sum of these should equal 100%.

**Figure 59. Virtual Route Status Trending**

In this panel, the trending interval is 15 minutes.
Pacing Window Size Trending

To view pacing window size trending information, follow these steps.

1. On the Virtual Route Analysis panel, enter $ for VR status) to the left of the subarea that is the destination of the virtual route you want to examine.

2. On the Virtual Route Status panel, enter gt (for Goto Trending) in the action bar entry field.

3. On the VR Trending pop-up window, identify the virtual route that interests you by typing its VR number and TP number. Select Average window size in the bottom section of the pop-up, and press Enter. The VR Trending for Average Window Size panel appears.

```
--- Goto Options Help
--------------------------------------------------------
KONDVTWD VR Trending for Average Window Size System: SYSA
for VR0 on TP1 from Subarea 2
Lines 1 to 10 of 22

The largest window size for the trending period was 50

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Window</th>
<th>Percent</th>
<th>0.10.20.30.40.50.60.70.80.90.100</th>
</tr>
</thead>
<tbody>
<tr>
<td>04/06/93</td>
<td>17:06:27</td>
<td>8</td>
<td>16.0%</td>
<td>====&gt;</td>
</tr>
<tr>
<td>04/06/93</td>
<td>16:51:11</td>
<td>7</td>
<td>14.0%</td>
<td>====&gt;</td>
</tr>
<tr>
<td>04/06/93</td>
<td>16:36:03</td>
<td>6</td>
<td>12.0%</td>
<td>====&gt;</td>
</tr>
<tr>
<td>04/06/93</td>
<td>16:20:41</td>
<td>10</td>
<td>20.0%</td>
<td>======&gt;</td>
</tr>
<tr>
<td>04/06/93</td>
<td>16:05:40</td>
<td>13</td>
<td>26.0%</td>
<td>======&gt;</td>
</tr>
<tr>
<td>04/06/93</td>
<td>15:50:35</td>
<td>13</td>
<td>26.0%</td>
<td>======&gt;</td>
</tr>
<tr>
<td>04/06/93</td>
<td>15:35:10</td>
<td>11</td>
<td>22.0%</td>
<td>=====&gt;</td>
</tr>
<tr>
<td>04/06/93</td>
<td>15:19:57</td>
<td>9</td>
<td>18.0%</td>
<td>=====&gt;</td>
</tr>
<tr>
<td>04/06/93</td>
<td>15:04:41</td>
<td>9</td>
<td>18.0%</td>
<td>=====&gt;</td>
</tr>
<tr>
<td>04/06/93</td>
<td>14:49:24</td>
<td>8</td>
<td>16.0%</td>
<td>=====&gt;</td>
</tr>
</tbody>
</table>

Command ====> __________________________________________________________________
F1=Help F2=Keys F3=Exit F5=Refresh F6=Console ***=Bkwd F8=Fwd F9=Retrieve
F10=Action Bar F11=Print F12=Cancel F15=Status Display
```

Figure 60. Virtual Route Window Size Trending

This panel shows the average window size during each trending interval, and graphs the percentage of the maximum window size represented by each interval's average window size. If the maximum window size is very high and the average window size is low, the value does not register on the graph.
**Message Traffic Trending**

**Note:** For significant data to display, sampling interval should not exceed 30 seconds.

To view message traffic trending information, follow these steps.

1. On the Virtual Route Analysis panel, enter **R** (for PIU rates) to the left of the subarea that is the destination of the virtual route you want to examine.

2. On the PIUs/Sec over Virtual Routes panel, enter **gt** (for Goto Trending) to the left of the action bar.

3. On the VR Trending pop-up window, identify the virtual route that interests you by entering its VR number and TP number. The VR Trending for PIUs/Second panel appears.

---

**Figure 61. Virtual Route Message Traffic Trending**

This panel shows the highest number of PIUs (inbound, outbound, and total) per second that traveled on the virtual route during each trending interval. The display also graphs the percentage of the highwater mark that each total represents. The highwater mark is the highest number of PIUs per second in any one trending interval.
Session Distribution Trending

To view session distribution trending information, follow these steps.

1. On the Virtual Route Analysis panel, enter D (for LU distribution) to the left of the subarea that is the destination of the virtual route you want to examine.

2. On the LU Session Distribution panel, enter gt (for Goto Trending) to the left of the action bar.

3. On the VR Trending pop-up window, identify the virtual route that interests you by entering its VR number and TP number. The VR Trending for LU Session Distribution panel appears.

Figure 62. Virtual Route Session Distribution Trending

This panel shows the number of active LU-LU sessions on the virtual route during each trending interval. It also graphs the percentage of the highwater mark that each number represents. The highwater mark is the highest number of LU-LU sessions on the virtual route in any one trending interval.
Case Study: Blocked Virtual Route

This is a typical virtual route problem and its solution.

1. It is late afternoon. The main status panel shows a red light for Virtual routes.

2. You enter X next to Virtual routes. The Exceptions panel shows that Virtual Route 0 to Subarea 2 is blocked.

3. You navigate to the Virtual Route Status panel for virtual routes to Subarea 2. VR 0 is still blocked. When you press F5 to refresh the screen, the state of VR 0 changes to held. You press F5 several more times. VR 0 is held most of the time but is occasionally blocked. The current window size is 15, which is also the maximum window size.

4. You examine trending displays for virtual route state, window size, and message traffic. The displays show that VR 0 reached its maximum window size of 15 in peak traffic early in the day. Since that time, VR 0 has been open most of the time. Increased traffic in the late afternoon has resulted in held and blocked states.

5. You now examine SAS graphs that show patterns of virtual route activity and performance over the past several days. The graphs confirm the same trend you observed today: VR 0 is at maximum window size most of the day, and becomes held or blocked during late-afternoon heavy traffic. The SAS graphs also show that VR0 is carrying almost all message traffic to Subarea 2.

6. To solve the problem, you take two actions:
   a. Increase the maximum window size.
   b. Change the class-of-service table to distribute sessions more evenly among the virtual routes to Subarea 2.

7. Over the next several days, you continue to examine trending data and SAS graphs. If necessary, you make further adjustments to maximum window size and session routing.

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
Historical Reports

If you have SAS/GRAPH installed and SMF recording enabled for VR data (see “Virtual Route Monitor Options” on page 317), you can generate historical reports over a longer period than the trending displays accommodate. The historical graphs provide comparisons of virtual route performance over time. These analyses show you daily patterns, and help you test the effects of your changes to the path definition statements or to the class-of-service table.

OMEGAMON II provides the following historical reports for virtual routes:

- comparison of pacing window sizes over time among the three transmission priorities on a virtual route
- comparison of message traffic rates among the three transmission priorities on a virtual route
- comparison of message traffic rates among the virtual routes to the same destination subarea

See the information about SAS reporting in the OMEGAMON II for VTAM Historical Reporting Guide for instructions on how to use this feature.

For Further VR Information

Virtual routes are a complex topic and this has only been a summary. For further information, see the following IBM publications:

- ACF Network Flow Control (technical bulletin)
- “Held VR”: Symptom, Problem, or Normal Operation? (technical bulletin)
- VR Performance and Window Size Tuning (technical bulletin)
Virtual Routes Component Navigation
Chapter 8. Tuning Statistics

Chapter Contents

Overview .......................................................... 142
Basic Tuning Objectives .......................................... 142
VTAM Tuning Statistics ........................................... 143
  TNSTATS Status Lights ....................................... 143
  TNSTATS Data Panels ......................................... 143
  What Happens in a NOTNSTAT Condition? .............. 144
Tuning to Increase Coattailing ................................ 144
CTC Tuning Statistics ........................................... 145
  CTC TNSTATs Displayed ..................................... 146
  CTC Channel Usage .......................................... 147
  Improving CTC Performance ................................ 147
Displaying CTC Data ............................................ 148
  Analyzing CTC Performance ................................ 150
  Multipath Channel Support ................................ 151
  Trends for CTCs ............................................. 156
  Trends for MPCs ............................................ 158
TNSTATs for CTCs Component Navigation ..................... 160
TNSTATs for Group MPC CTCs Navigation .................... 161
TNSTATs for Subchannel MPC CTCs Navigation ............... 162
CTC TNSTATs Trending Navigation ............................. 163
SNA Controllers (NCP and Local) ............................. 164
  How VTAM Reads Data from SNA Controllers ............ 164
NCP Tuning Statistics ........................................... 165
  NCP Channel Usage ......................................... 166
  Improving NCP Performance ................................ 166
  Displaying NCP Data ....................................... 167
  Analyzing NCP Performance ................................ 168
  Trends for NCPs ............................................. 169
TNSTATs for NCPs Component Navigation ..................... 171
NCP TNSTATs Trending Navigation ............................. 172
Historical Reports ............................................... 173
Local Tuning Statistics ......................................... 174
  Local Channel Usage ....................................... 174
  Improving Local Performance .............................. 174
  Displaying Local Data ..................................... 175
  Analyzing Local Performance .............................. 176
  Trends for Locals .......................................... 177
TNSTATs for Locals Component Navigation .................... 178
Local TNSTATs Trending Navigation ........................... 179
Fastpathing to Trending Displays .............................. 180
Overview

This chapter introduces you to VTAM's tuning statistics (TNSTATs), which gather information about the transfer of data among network channels. By examining the TNSTATs information, you can determine the best way to tune VTAM, which is a process of balancing the network load to avoid congestion.

After a brief discussion of basic tuning objectives and the use of tuning statistics, the chapter focuses on OMEGAMON II's tuning statistics components: channel-to-channel (CTC) including multipath channels (MPC), Network Control Program (NCP), and locally attached controllers. Each of the three tuning statistics components displays and analyzes channel performance data from locally attached network devices.

Basic Tuning Objectives

VTAM, using MVS services, drives data across the following types of network channels:

CTCA CTC
Uses a single subchannel to connect a host processor to another host.

MPC CTC
Uses multiple, single-direction read and write subchannels to transmit data.

NCP
Connects a host processor to a terminal controller that contains Network Control Program software.

Local
Connects a host processor to local SNA terminal controllers.

The object in tuning VTAM is to move the data across the channels as quickly and efficiently as possible. By changing VTAM's tuning parameters, you can adjust the way the channel program reads data into VTAM or writes data out to an attached device.

Basic tuning objectives include:

- achieving the fastest terminal response time possible
- using the least amount of CPU cycles from the host processor
- using storage more efficiently in the host and network controller
- increasing coattailing, the process of sending or receiving more than one message over the channel every time the channel is scheduled (See “Tuning to Increase Coattailing” on page 144)
VTAM Tuning Statistics

You must specify **TNSTATS** in the start option list of VTAM or by VTAM operator command to enable the collection of tuning statistics.

**TNSTATS Status Lights**

OMEGAMON II's status lights represent the flow of data among network channels. If there appears to be a problem in the data flow (indicated by a yellow or red status bar), you can navigate through a series of panels that locate the source of congestion.

**TNSTATS Data Panels**

Each tuning statistics panel contains information about the flow of data between VTAM and SNA terminal controllers (NCP or local), or between two VTAMs housed in separate host processors (connected by CTC channels).

TNSTATS information helps you to adjust parameters in your VTAMLST dataset so that the load on the host is decreased and channel efficiency is increased.

The TNSTATS panels include such information as the number of:

- inbound messages
- outbound messages
- channel operations
- buffers used
- times the attached devices went into slowdown mode

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
What Happens in a NOTNSTAT Condition?

If you issue the following VTAM command

```
F procname,NOTNSTAT
```

VTAM stops recording tuning statistics.

When OMEGAMON II detects a NOTNSTAT condition, it does the following:

1. Stops generating trend records for CTC, NCP, and LOCAL devices.
2. Sets turquoise status lights for CTC, NCP, and LOCAL TNSTATS on the main status panel and sets the text within these lights to NOTNSTAT.
3. When the main status light indicates NOTNSTAT, the following are displayed on the corresponding List of CTCs, NCPs, or LOCALs panel:
   a. only configuration data for CTCs, NCPs, or LOCALs
   b. message KONCV145 stating Tuning Statistics are not active
   c. for each device, a turquoise condition field containing the text IDLE

Tuning to Increase Coattailing

Coattailing is a process in which

- more than one message is transferred to the host without generating an attention interrupt
- multiple messages are sent outbound
- a combination of multiple inbound and outbound messages occurs

Coattailing reduces the number of channel programs that must be executed. This decreases channel and host usage, but may slightly increase response time. Despite the tradeoff, coattailing is generally advantageous. By analyzing OMEGAMON II's tuning statistics data, you can decide which VTAM parameters to change to increase coattailing.
A VTAM attached to another VTAM through a channel-to-channel adapter is a channel-to-channel (CTC) VTAM connection. When initialized, the VTAMs first use an exchange ID (XID) procedure to exchange product, level, and definition information. Once the connection has been established, the VTAM that initiated XID writes first, then reads; the other VTAM reads first, then writes.

The following is a typical CTC tuning statistics panel.

![CTC Tuning Statistics Panel](image)

**Figure 63. CTC Tuning Statistics Panel**
CTC TNSTATs Displayed

CTC tuning statistics for the VTAM TNSTAT interval, which are shown in the previous figure, include the following:

**CHNRM (t)**  Number of channel programs issued.

**ATTN (t)**  Number of channel programs that were started because the host had data to send.

**OPIU (t)**  Number of outbound Path Information Units. (PIUs)

**IPIU (t)**  Number of inbound PIUs.

**PRI**  Number of times VTAM initiated a channel program because a high-priority PIU needed to be sent.

**RDBUF (t)**  Number of bytes transferred during the indicated interval.

**SLODN (t)**  Number of times a channel program was completed but the data could not be sent because the other VTAM's buffers were full. You should have a SLODN value of zero. To avoid slowdowns, the IOBUF expansion point in the second VTAM should be greater than MAXBFRU (maximum) minus MAXBFRU (normal).

**TIMERS**  Number of times a channel program was initiated because the interval specified for delaying channel-to-channel PIUs expired.

**QDEPTH**  Number of times a channel program was started because the delay limit has been reached.

**BUFCAP**  Number of times a channel program was started because one VTAM received a burst of data that filled the read buffers of another VTAM connected by a CTC channel.

*Note:* The (t) next to a TNSTAT listed above indicates that trending is available. Refer to “Trends for CTCs” on page 156 for how to access the trending displays.
CTC Channel Usage

CTC channel usage is characterized by:

- the number of times the channel is activated
- the number of bytes in each transfer

A channel program is activated for one of four reasons:

- The timer expires.
  The DELAY parameter (in the channel major node definition in the VTAMLST dataset) specifies the time for VTAM queuing. When the timer expires, VTAM initiates a channel operation. OMEGAMON II displays this value in the TIMERS field.

- The QDEPTH limit is reached.
  The QDEPTH parameter depends on the DELAY parameter. VTAM multiplies the number of PIUs that were sent in the previous delay interval by 0.75. When this number of PIUs are queued during the next interval, VTAM initiates a channel program. This is a way for VTAM to keep up with dynamic changes in the traffic pattern. OMEGAMON II displays this value in the QDPTH field.

- The buffers fill up.
  The MAXBFRU parameter specifies the block size (in pages) that VTAM uses for fixed-length channel program transfers. The MAXBFRU values are exchanged during XID. If a VTAM gets a burst of data in a short period of time that can fill the buffers of the other VTAM, it initiates a channel operation. OMEGAMON II displays this value in the BUFCAP field.

- Priority traffic must be sent.
  VTAM initiates a channel program for a virtual route pacing response or for Transmission Priority 2 (TP2) traffic. OMEGAMON II displays this value in the PRI field.

Improving CTC Performance

There are two goals to meet when tuning CTC connections:

- Minimize requests for I/O buffers.
- Reduce system I/O operations.

The following can be changed:

- MAXBFRU
- buffer pool parameters
- virtual route window sizes
- number of high-priority PIUs
Displaying CTC Data

When you select **TNSTATS for CTCs** from the main status panel, OMEGAMON II displays a list of CTC connections as shown in the following figure.

For each CTC, this panel shows

- CTC name
- MVS device address
- CTC line name
- CTC type
- name of the Cross Domain Resource Manager (CDRM) in the adjacent host
- adjacent subarea number
- condition of the CTC

You select a CTC by entering an action code next to the CTC name. Both channel-to-channel adapter (CTCA) and multipath channeling (MPC) groups and subchannels are displayed.

To monitor an MPC group, select a CTC with type **MPC GROUP**.

To monitor an MPC subchannel, select a CTC with type **MPC READ** or **MPC WRITE**.
You can choose a CTC from the list by entering one of the following action codes:

- **X** List the exceptions.
- **S** Display raw TNSTATS data.
- **R** Display the rate of change to the raw TNSTATS data.
- **A** Display analyzed TNSTATS data.
- **N** Display the rate of change to the analyzed TNSTATS data.
Analyzing CTC Performance

When you select a CTC for analysis (by entering A next to CTC30, for example), OMEGAMON II displays the analysis panel.

```
[72x718]  ____________ Goto Options Help
  ---------------------------------------------------------------
KONDCTAD  CTC TNSTATS Analysis
  Address: OC06  Name: CTC30  CTC Line: CTC3OL

+-----------------------------------------------------------------------------+
<table>
<thead>
<tr>
<th>Interval: 120 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average bytes per CHPRG . .</td>
</tr>
<tr>
<td>Average OPIUS per CHPRG . .</td>
</tr>
<tr>
<td>Bytes in for last CHPRG . .</td>
</tr>
<tr>
<td>Bytes out for last CHPRG . .</td>
</tr>
<tr>
<td>Max write delay (ms) . . . .</td>
</tr>
</tbody>
</table>
+-----------------------------------------------------------------------------+

Field | Pct | Percentage Breakdown of SIO Requests |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TIMERS</td>
<td>6.5%</td>
<td>===&gt; . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>QDPTH</td>
<td>61.3%</td>
<td>==============&gt;. . . . . . . . . . .</td>
</tr>
<tr>
<td>BUFCAP</td>
<td>.0%</td>
<td>. . . . . . . . . . . . . . . . . . .</td>
</tr>
<tr>
<td>PRI</td>
<td>32.0%</td>
<td>=============&gt;. . . . . . . . . . .</td>
</tr>
</tbody>
</table>
+-----------------------------------------------------------------------------+

Command ===> F1=Help  F2=Keys  F3=Exit  F5=Refresh  F6=Console  F9=Retrieve  F10=Action Bar
F11=Print  F12=Cancel  F15=Status_Display
```

Figure 65. CTC TNSTATS Analysis Panel

This panel provides important information:

Coattailing indicator
Average number of outbound PIUs (OPIUs) per channel program (Average OPIUs per CHPRG). If this number is greater than one, coattailing took place during the interval. The larger the number, the greater the coattailing.

Transmission Subsystem Control Block (TSCB) pending queue
Number of I/O buffers queued with data to be sent.

Percentage of start I/O (SIO) requests caused by TIMERS, QDPTH, BUFCAP, and PRI
Graphically depicts why the channel is being scheduled. (See “CTC Channel Usage” on page 147.)

CTC pages per buff
Number of 4K pages used for buffering I/O by both the X-side and the Y-side of a CTC. The first expression (at the left) is the number of pages used for buffering by this host; the second expression (at the right) refers to the other host. The X indicates the host that started up
first and the Y indicates the host that started up second. The number of pages for I/O buffers are set with MAXBFRU in the PU statement of the CTC's VTAM definition in VTAMLST.

**Multipath Channel Support**

Before Version 4.1.0, VTAM included only channel-to-channel adapter (CTCA) CTCs, which use a single subchannel to read and write data. Multipath channeling (MPC) allows multiple read and write subchannels to be grouped together, thereby providing full-duplex, channel-to-channel communication between different VTAMs.

Traditionally, VTAM provides a single set of statistics for each CTCA CTC. However, for each MPC CTC, VTAM provides the following:

- a separate set of tuning statistics for each individual read or write subchannel
- a set of group tuning statistics that contain measurements for the entire MPC CTC (called an MPC group)

The following definitions are associated with multipath channel support:

**CTCA CTCs**

Use a single subchannel to read and write data.

**MPC CTCs**

Use multiple, single-direction read and write subchannels to transmit data.

**subchannel tuning statistics**

Provide separate measurements for each MPC subchannel.

**group tuning statistics**

Provide combined measurements for all subchannels assigned to an MPC group.

Multipath channel support provides the following information about MPC CTC groups and individual read and write subchannels:

- raw TNSTATs for MPC groups and subchannels
- analysis of those TNSTATs
- MPC exceptions and trends online
- SMF trend and exception data
The following panel is an example of MPC group tuning statistics. When you select S (TNSTATS) for an MPC group from the List of CTCs panel (Figure 64 on page 149), this panel displays.

![Figure 66. MPC CTC Group TNSTATS Panel](image1)

When you select R (Rate/Second) for an MPC Group from the List of CTCs panel (Figure 64 on page 149), this panel displays. The panel shows MPC group tuning statistics for the interval since your last refresh. (The Sample Interval field displays the length of the most recent interval.)

![Figure 67. MPC CTC Group TNSTATS Rate/Second](image2)
When you select **A** (Analysis) for an MPC group from the List of CTCs panel (Figure 64 on page 149), this panel displays. The panel shows an analysis of the tuning statistics for an MPC group.

---

**Figure 68. MPC CTC Group TNSTATS Analysis Panel**

When you select **N** (Analysis/Second) for an MPC group from the List of CTCs panel (Figure 64 on page 149), this panel displays. The panel shows an analysis of MPC group tuning statistics for the interval since your last refresh.

---

**Figure 69. MPC CTC Group TNSTATS Analysis/Second**
When you select $ (TNSTATS) for an MPC read or write subchannel from the List of CTCs panel (Figure 64 on page 149), this panel displays. The panel shows tuning statistics for a read or write subchannel assigned to an MPC group.

![Figure 70. MPC CTC Subchannel TNSTATS](image)

When you select $R$ (Rate/Second) for an MPC read or write subchannel from the List of CTCs panel (Figure 64 on page 149), this panel displays. The panel shows MPC read or write subchannel tuning statistics for the interval since your last refresh.

![Figure 71. MPC CTC Subchannel TNSTATS Rate/Second](image)
When you select A (Analysis) for an MPC read or write subchannel from the List of CTCs panel (Figure 64 on page 149), this panel displays. The panel shows an analysis of the tuning statistics for an individual read or write subchannel assigned to an MPC group.

![Figure 72. MPC CTC Subchannel TNSTATS Analysis](image)

When you select N (Analysis/Second) for an MPC read or write subchannel from the List of CTCs panel (Figure 64 on page 149), this panel displays. The panel shows an analysis of MPC read or write subchannel tuning statistics for the interval since your last refresh.

![Figure 73. MPC CTC Subchannel TNSTATS Analysis/Second](image)
Trends for CTCs

OMEGAMON II supplies graphs of recent trends for selected data items. These trends provide a perspective of the system over time. Optionally, the trending data can be written to an SMF dataset and displayed or printed as SAS graphs (if you have SAS available).

To view trending for CTCs, perform the following steps:

1. On the CTC TNSTATS - List of CTCs panel (see Figure 64 on page 149), enter action code S (TNSTATS) or A (Analysis) next to a CTC of interest.

2. On the corresponding CTC TNSTATS or CTC TNSTATS Analysis panel, enter GT in the action bar entry field.

3. Select a TNSTAT for trending from the Trends menu.
   - From the TNSTATs panel, trending is available for:
     - channel programs
     - attentions
     - outbound PIUs
     - inbound PIUs
     - read buffers
     - slowdowns
   - From the Analysis panel, trending is available for:
     - SIO requests by TIMERS
     - SIO requests by QDPTH
     - SIO requests by BUFCAP
     - SIO requests by PRIORITY
     - SIO requests for all reasons
     - bytes per channel program
The following figure shows a trending panel for the SIO reason QDPTH.

![Graph and Table]

**Figure 74. CTC Analysis Trending of Individual SIO Reasons Panel**

The Percent field on this panel represents the percentage of SIO requests made for this reason, during the trend interval, relative to the total number of SIO requests.
Trends for MPCs

In addition to MPC TNSTATs, reports, and analysis, OMEGAMON II provides graphs of trends for selected MPC TNSTATs.

From the MPC Group TNSTATS panel, trending is available for
- inbound PIUs
- outbound PIUs
- queue sweeps
- timer sweeps

From the MPC Group TNSTATS Analysis panel, trending is available for
- average inbound PIU size
- average inbound PIUs per SIO
- average outbound PIU size
- average outbound PIUs per SIO

From the MPC Subchannel TNSTATS panel, trending is available for
- byte count
- MAXBYTES
- SIOs
- slowdowns

From the MPC Subchannel TNSTATS Analysis panel, trending is available for
- bytes per SIO
- buffer utilization percentage
- group SIO contribution
- group byte count contribution
The following figure shows a trending panel for MPC CTC Subchannel TNSTATS.

Figure 75. MPC CTC Subchannel TNSTATS Statistics Trending – Byte Count

The panel displays the total number of bytes sent or received for each trend recording interval. (Note that the highest value is displayed above the table headings.)
TNSTATs for CTCs Component Navigation

KONDMAIN
VTAM Main Status

KONDCTMD
List of CTCs

X
S

KONDXCDD
CTC Exceptions

KONDCTSD
CTC TNSTATs

KONDCTRD
CTC TNSTATs Rate/sec

KONDCTAD
CTC TNSTATs Analysis

KONDCTND
CTC TNSTATs Analysis/ sec

X
S
R
A
N

X
S

Goto Trends
S=Show Recommendation

KONDFnnn
Recommend. for Exc. nnn

Goto Trends

CTC Trending Displays
TNSTATs for Group MPC CTCs Navigation

KONDMAIN
VTAM Main Status

KONDCTMD
List of CTCs

Select MPC GROUP

KONDXCDD
Exceptions for MPC CTC Group

KONDMGSD
MPC CTC Group TNSTATs

KONDMGRD
MPC CTC Group TNSTATs Rate/sec

KONDMGAD
MPC CTC Group TNSTATs Analysis

KONDMGND
MPC CTC Group TNSTATs Analysis/sec

S=/SV040000Show Recommendation
KONDfnnn
Recommend. for Exc. nnn

Goto panel
Select Trends

KONDMGSP
Trends Menu

KONDMGAP
Trends Menu

KONDMGID
MPC CTC Group Trending

KONDMG2D
MPC CTC Group Trending

IPIUs OPIUs QSWEEP TSWEEP
Average IPIU size Average OPIU size

Average IPIU per SIO Average OPIU per SIO

Chapter 8. Tuning Statistics 161
CTC TNSTATs Trending Navigation

- KONDMAIN: VTAM Main Status
  - KONDCTMD: List of CTCs
    - S: KONDCTSD - CTC TNSTATs
    - A: KONDCTAD - CTC TNSTATs Analysis
      - GT: KONDCTSP - Trends Menu
        - Select TNSTAT
          - CHNRM: KONDCT2D - TNSTAT Trends
            - ATTN: KONDCTTD - CTC Trends
              - IPIU: SIO Req. All Reasons
              - OPIU: SIO Req. one Reason
              - RDBUF: BUFCAP
              - SLODN: PRI
            - Select TNSTAT
              - TIMERS QDPTN BUFCAP PRI
              - KONDCT3D: CTC Trends Bytes per Channel Pgm
              - KONDCT4D: CTC Trends
SNA Controllers (NCP and Local)

VTAM reads and writes data to SNA controllers (NCP and locally attached terminal controllers) via NCP and local channels:

NCP  A communications controller housing the Network Control Program (NCP) is attached to the host through the NCP channel connection. Inside the controller, NCP handles the intake and transfer of data from remote controllers to the host processor. It functions as a network traffic cop, saving the host from having to deal with traffic control of data.

Local  VTAM transfers data to and from a cluster controller attached to local terminals (usually in the same building as the host processor, or nearby)

How VTAM Reads Data from SNA Controllers

VTAM has two ways to read data from NCP and locally attached controllers:

1. As a standalone attention interrupt (ATTN)
   When an SNA controller has data to send to VTAM, the controller sends an attention interrupt to VTAM requesting a read operation.

2. As a read attention (RDATN)
   A read attention is an immediate sequel to a VTAM write function. If the controller gathered more data to send VTAM while VTAM was performing a write function, then VTAM immediately reads that data without a separate attention interrupt.

Read attentions are caused by the following situations:

- The communication controller receives more information during the read operation, causing it to request VTAM to perform another read.
- The channel command words (CCWS) in the read channel program are not long enough to contain all the data sent.

Read attentions coattail PIUs to the host processor. While such coattailing is preferable to standalone attention interrupts, a high RDATN value is not desirable because it creates poor terminal response time.
A single set of VTAM tuning statistics may be sufficient to indicate how the network is functioning. However, it's a good idea to compare sets of TNSTATS values over time to see differences and trends caused by changing parameters and buffer pool specifications.

The following is an example of an SNA (NCP) controller tuning statistics panel:

```
<table>
<thead>
<tr>
<th></th>
<th>CHWR</th>
<th>CHRD</th>
<th>ATTN</th>
<th>RDATN</th>
<th>PIUs Inbound</th>
<th>PIUs Outbound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total count of write channel programs</td>
<td>40,485</td>
<td></td>
<td></td>
<td></td>
<td>51%</td>
<td>49%</td>
</tr>
<tr>
<td>Total count of read channel programs</td>
<td>21,643</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total attention indications received</td>
<td>13,279</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of attentions at end of read program</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of inbound PIUs to VTAM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of outbound PIUs from VTAM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total count of VTAM read buffers used</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Times NCP entered Slowdown condition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
```

Figure 76. NCP Tuning Statistics Panel

This panel displays the following tuning statistics:

- **CHWR**: Number of write channel programs initiated during the indicated interval.
- **CHRD**: Number of read channel programs initiated to read data.
- **ATTN**: Number of attention interrupts received from the communications controller, including the number of read attentions.
- **RDATN**: Number of times VTAM, after reading data, was immediately requested to read more data.
- **IPIU**: Number of PIUs sent to the host by the controller.
- **OPIU**: Number of PIU’s sent to the controller.
- **RDBUF**: Number of VTAM buffers used for read functions.
- **SLODN**: Number of times the controller went into slowdown mode.
When you are on this panel, you can select trending displays from the Goto pull-down for any of the TNSTATs displayed. See “Trends for NCPs” on page 169 for how to access trending displays.

**NCP Channel Usage**

NCP channel usage is determined by both of the following:

- the size of the channel programs
- the number of buffers transferred

A channel program is activated for one of four reasons:

1. The timer expires.
   The `DELAY` parameter (in the NCP BUILD definition statement) specifies the elapsed time between the receipt of the first inbound message and the presentation of an attention message to VTAM.

2. The `QDEPTH` limit is reached.
   The `QDEPTH` parameter depends on the `DELAY` parameter. VTAM multiplies the number of PIUs that were sent in the previous delay interval by 0.75. When this many PIUs are queued during the next interval, VTAM initiates a channel program. This is a way for VTAM to keep up with dynamic changes in the traffic pattern.

3. The buffer fills up.
   The `MAXBFRU` parameter (specified in the NCP HOST definition) specifies the number of I/O buffers allocated by VTAM for one inbound data transfer.

4. Priority traffic must be sent.
   VTAM initiates a channel program for a virtual route pacing response or for Transmission Priority 2 (TP2) traffic.

**Improving NCP Performance**

When you tune NCP connections, you have three goals:

1. Limit the size of channel programs.
2. Minimize requests for I/O buffers.
3. Reduce system I/O operations.
You can change the following VTAM tuning parameters:

- I/O buffer size
- MAXBFRU
- buffer pool parameters
- virtual route window sizes
- number of high-priority PIUs

Increasing the I/O buffer size can reduce the size of the channel program.

**Displaying NCP Data**

The following panel displays a list of NCP connections. There are three ways to reach this panel:

1. Select **TNSTATS for NCPs** from the main status panel.
2. Press F22 (TNSTATs) from the NCP Status Summary panel in the NCP performance component.
3. Press F22 (TNSTATs) from the NCP Statistics Summary panel in the NCP performance component.

---

![NCP Tuning Statistics Panel](image)

**Figure 77. NCP Tuning Statistics Panel**

For each NCP, this panel indicates

- NCP name
- MV5 device address
- NCP line name
- NCP subarea number
- name of the NCP line node
- condition of the NCP

You can choose an NCP connection from the list by entering one of the following action codes:

X  List the TNSTATS exceptions.
S  Display raw TNSTATS data.
R  Display the rate of change to the raw TNSTATS data.
A  Display analyzed TNSTATS data.
N  Display the rate of change to the analyzed TNSTATS data.

If you press F22 (NCP Performance), you navigate to the NCP performance component in one of the two following ways:
- If you came from the NCP performance component, you return to the panel from which you came.
- If you haven’t come from the NCP performance component, you navigate to the NCP Status Summary panel.

**Analyzing NCP Performance**

When you select an NCP for analysis, OMEGAMON II displays the NCP TNSTAT Analysis panel.

![NCP TNSTATS Analysis Panel](image)

Figure 78. NCP TNSTATS Analysis Panel
This panel displays the coattailing indicator, which is the average number of inbound PIUs (IPIUs) per NCP channel read. If this number is greater than one, coattailing took place during the interval. The larger the number, the greater the coattailing.

**Trends for NCPs**

OMEGAMON II supplies graphs of statistical trends for selected data items. These trends indicate the average activity of the system over a period of time. Optionally, the trending records can be written to an SMF dataset and displayed or printed as SAS graphs (if you have SAS available).

To view trending for NCPs, perform the following steps:

1. On the NCP TNSTATS - List of NCPs panel (Figure 77 on page 167), enter action code $ (TNSTATS) or A (Analysis) next to an NCP of interest.

2. On the corresponding NCP TNSTATS or NCP TNSTATS Analysis panel, enter GT in the action bar entry field.

3. Select an NCP TNSTAT for trending from the Trends menu.
   - When you are on the TNSTATs panel, trending is available for any of the TNSTATs displayed:
     - channel writes
     - channel reads
     - attentions
     - read attentions
     - inbound PIUs
     - outbound PIUs
     - read buffers
     - slowdowns
   - When you are on the Analysis panel, you can select trending for inbound PIUs per read and outbound PIUs per write.
The following figure is an example of the NCP Trending panel for Channel Writes.

```plaintext
The highest number of channel writes was 162.

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>CHWR</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>07/27/92</td>
<td>15:00:00</td>
<td>162</td>
<td>100.00%</td>
</tr>
<tr>
<td>07/27/92</td>
<td>14:30:00</td>
<td>149</td>
<td>91.97%</td>
</tr>
<tr>
<td>07/27/92</td>
<td>14:00:00</td>
<td>156</td>
<td>96.29%</td>
</tr>
<tr>
<td>07/27/92</td>
<td>13:30:00</td>
<td>157</td>
<td>96.31%</td>
</tr>
</tbody>
</table>
```

Figure 79. NCP Trending Panel

An NCP Trending panel charts the trend for the selected TNSTAT over the course of a day, based on a specified time interval. The most recent time interval is displayed first. The data displayed represents the totals for the TNSTAT during the trend period. The trend record with the largest value is the relative 100% mark. All other trend records are measured against the high point. Each trend record potentially resets the high point.

The fields listed on an NCP Trending panel are described below:

- **Date**: Date the trend record was created.
- **Time**: Time the trend record was created.
- **Percent**: Percentage of this TNSTAT value as compared to the highest value for the TNSTAT.
NCP TNSTATs Trending Navigation
If you have SAS/GRAPH installed, and SMF recording enabled for CTC and/or NCP tuning statistics (see “Tuning Statistics Monitoring Control Options” on page 326, and “Tuning Statistics Options for NCPs” on page 327), you can display color historical graphs of these kinds of data.

For CTC connections, you can display a comparison of the reasons for an SIO request (described in “CTC Channel Usage” on page 147):

- priority PIUs received
- buffers filled
- queue depth reached
- time expired

For NCP connections, you can display:

- The VTAM buffer allocation (IPIU/RDBUF) over time.
  
  **IPIU**  Number of inbound PIUs.

  **RDBUF**  Total number of buffers used by VTAM for reading data from the NCP.

- The coattailing indicator (ATTN/CHRD) over time.

  **ATTN**  Number of attention signals received from the NCP.

  **CHRD**  Total number of read channel programs issued to read data.

For instructions on using this feature, see the information about SAS reporting in the *OMEGAMON II for VTAM Historical Reporting Guide*. 
Local Tuning Statistics

VTAM maintains TNSTATS for locally attached 3x74 SNA control units.

Local Channel Usage

Local channel usage is determined by:
- the size of the data buffer
- the number of buffers transferred
- the number of attention interrupts

Improving Local Performance

Changing the number of buffers and the buffer size in the host can help you to use storage more efficiently. Changing controller parameters to reduce the number of attention interrupts and adjusting buffer pool parameters to minimize expansion and contraction can help you to save host cycles.
**Displaying Local Data**

When you select **TNSTATS for LOCALs** from the main status panel, you see the LOCAL TNSTATS panel which is a list of local connections.

---

<table>
<thead>
<tr>
<th>LOCAL Name</th>
<th>Device Address</th>
<th>Device Node</th>
<th>Subarea</th>
<th>Major Node</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>_ L610</td>
<td>0610</td>
<td>L610</td>
<td>2</td>
<td>LOC610</td>
<td>Critical</td>
</tr>
<tr>
<td>_ L618</td>
<td>0618</td>
<td>L618</td>
<td>2</td>
<td>LOC618</td>
<td>Normal</td>
</tr>
<tr>
<td>_ L617</td>
<td>0617</td>
<td>L617</td>
<td>2</td>
<td>LOC617</td>
<td>Normal</td>
</tr>
<tr>
<td>_ L616</td>
<td>0616</td>
<td>L616</td>
<td>2</td>
<td>LOC616</td>
<td>Normal</td>
</tr>
<tr>
<td>_ L615</td>
<td>0615</td>
<td>L615</td>
<td>2</td>
<td>LOC615</td>
<td>Normal</td>
</tr>
<tr>
<td>_ L614</td>
<td>0614</td>
<td>L614</td>
<td>2</td>
<td>LOC614</td>
<td>Normal</td>
</tr>
<tr>
<td>_ L613</td>
<td>0613</td>
<td>L613</td>
<td>2</td>
<td>LOC613</td>
<td>Normal</td>
</tr>
<tr>
<td>_ L612</td>
<td>0612</td>
<td>L612</td>
<td>2</td>
<td>LOC612</td>
<td>Normal</td>
</tr>
<tr>
<td>_ L611</td>
<td>0611</td>
<td>L611</td>
<td>2</td>
<td>LOC611</td>
<td>Normal</td>
</tr>
</tbody>
</table>

---

You can choose a local connection from the list by entering one of the following action codes:

- **X** List the TNSTATS exceptions.
- **S** Display raw TNSTATS data.
- **R** Display the rate of change to the raw TNSTATS data.
- **A** Display analyzed TNSTATS data.
- **N** Display the rate of change to the analyzed TNSTATS data.
Analyzing Local Performance

When you select a local device for analysis (by entering action code A next to \textbf{L610}, for example), OMEGAMON II displays the LOCAL TNSTATS Analysis panel. This panel can help you to assess local performance.

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of IPIUs per LOCAL channel read . . . . . . . .</td>
<td>1.03</td>
</tr>
<tr>
<td>Average number of OPIUs per LOCAL channel write . . . . . . .</td>
<td>1.02</td>
</tr>
<tr>
<td>Average number of buffers per inbound PIU . . . . . . . . . .</td>
<td>1.00</td>
</tr>
<tr>
<td>Average number of buffers per channel read . . . . . . . . .</td>
<td>1.03</td>
</tr>
<tr>
<td>Percent of channel reads caused by an LOCAL ATTN . . . . . .</td>
<td>99.65%</td>
</tr>
<tr>
<td>Percent of channel reads after channel writes . . . . . . . .</td>
<td>0.35%</td>
</tr>
<tr>
<td>Percent of read buffers used . . . . . . . . . . . . .</td>
<td>99.30%</td>
</tr>
<tr>
<td>Percent of channel standalone reads . . . . . . . . . .</td>
<td>96.75%</td>
</tr>
</tbody>
</table>

Figure \textbf{81}. Local TNSTATS Analysis Panel
Trends for Locals

OMEGAMON II supplies graphs of statistical trends for many of the TNSTATs displayed on the LOCAL TNSTATS and LOCAL TNSTATS Analysis panels. These trends indicate the average activity of the system over a period of time. Optionally, the trending records can be written to an SMF dataset and displayed or printed as SAS graphs (if you have SAS available).

To view trending for LOCALs, perform the following steps:

1. On the LOCAL TNSTATS - List of LOCALs panel (see Figure 80 on page 175), enter action code $ (TNSTATS) or A (Analysis) next to a local unit of interest.

2. On the corresponding LOCAL TNSTATS or LOCAL TNSTATS Analysis panel, enter GT in the action bar entry field.

3. On the Trends menu, select a local TNSTAT for trending:
   - From the TNSTATS panel, trending is available for any of the TNSTATs displayed:
     - channel writes
     - channel reads
     - attentions
     - read attentions
     - inbound PIUs
     - outbound PIUs
     - read buffers
     - slowdowns
   - From the Analysis panel, you can select trending for inbound PIUs per read or outbound PIUs per write.
TNSTATS for Locals Component Navigation

[Diagram]

KONDMAIN
VTAM Main Status

KONDLOMD
List of Locals

KONDXCDD
Local Exceptions

KONDLOSD
Local TNSTATs

KONDLORD
Local TNSTATs Rate/sec

KONLOAD
Local TNSTATs Analysis

KONDLOND
Local TNSTAT Analysis/sec

Goto Trends
S=Show Recommendation

Local Trending Displays
(See next page)
Fastpathing to Trending Displays

When you are on any TNSTAT or TNSTAT Analysis panel, you can access the Trends menu by entering fastpath GT in the action bar entry field.

To navigate directly to the TNSTAT trending display, enter fastpath GTc in the action bar entry field, where c is the mnemonic for the TNSTAT that is listed on the corresponding Trends menu. Some examples of fastpaths to trending displays follow:

- **GTA**    Navigates to Trending for Attentions.
- **GTW**    Navigates to Trending for Channel Writes.
- **GTR**    Navigates to Trending for Channel Reads.
Chapter 9. Response Time

Chapter Contents

Overview .................................................. 182
Types of Response Time ................................ 182
Types of Sessions That Can Be Monitored .............. 183
How OMEGAMON II Collects Response Time Data ...... 184
  Definite Response Protocol ............................ 184
  Exception Response Protocol ....................... 184
How OMEGAMON II Calculates Response Times ....... 185
How OMEGAMON II Counts PIUs ..................... 186
Support for Multisession Managers .................... 186
OMEGAVIEW Considerations ................................ 186
Response Time Status Light ............................. 187
How to Obtain Response Time Information .............. 188
  Adding a Resource or Application to Monitor ...... 188
  Activating Monitoring ................................ 191
  Listing LU Response Times .......................... 192
  Displaying Exceptions ............................... 193
  Collapsing the List .................................. 193
  Deactivating Monitoring ............................. 193
  Starting at Logon .................................... 193
  Deleting a Definition ............................... 193
  Changing a Definition ............................... 193
  Viewing Sessions ..................................... 194
  Obtaining Resource Analysis ....................... 195
  Navigating to the NCP Component ................... 195
  Highlighting Groups .................................. 195
  Refreshing Response Time Displays .................. 195
  Clearing Counts ..................................... 196
  How Sessions Are Routed ............................ 196
  Summarizing Subareas ................................ 196
  Summarizing Virtual Routes for a Subarea .......... 197
  Summarizing LUs for a Virtual Route ................. 198
Historical Reports ....................................... 198
Response Times Component Navigation .................. 199
Overview

If you have installed and enabled the End-to-End Response Time Feature (ETE), OMEGAMON II can report several types of response time for SNA terminals connected to applications on the host. You can use this response time information to establish appropriate service-levels and to verify and trace reported response time problems.

This chapter explains each type of response time, tells how OMEGAMON II collects response time data, and gives suggestions for using the response time information. See these manuals for:

Installing ETE OMEGAMON II installation instructions shipped with the product

Enabling and disabling ETE OMEGAMON II for VTAM Configuration and Customization Guide

Further information End-to-End Response Time Feature (ETE) Reference Manual

Types of Response Time

OMEGAMON II reports several types of response time for SNA terminals connected to applications on the host:

- **End-to-end response time** is the time experienced by a user who has pressed a key and is waiting for a response at the terminal.
- **Host response time** is the time the user's request and the application's response spend in VTAM and in the application.
- **Network response time** is the time the request and its response spend traveling through the network outside the host. This interval includes all time spent in front-end processors, modems, and telephone lines.

Host response time and network response time are the two components of end-to-end response time. In cross-domain environments, where terminals owned by another host are in session with applications on the host of the VTAM being monitored, network time includes the time in the other host. The time in the other host is generally a small component of network time.
Types of Sessions That Can Be Monitored

Using ETE, OMEGAMON II can monitor host, network, and total transit times for normal SNA LU type 2 devices in direct session with applications on OMEGAMON II's VTAM domain. A parameter can be passed to ETE to:

- provide special handling to LU types 1 and 3
- treat these LU types no differently from LU type 2
- avoid forcing definite response on LU types 1 and 3
- avoid monitoring LU types 1 and 3 in any way

See the *End-to-End Response Time Feature (ETE) Reference Manual* for detailed information on specifying this parameter.

In addition to these direct (or native) sessions, OMEGAMON II can monitor sessions routed through a properly configured multisession manager (MSM) such as CL/SUPERSESSION. When monitoring by application or application group (as opposed to terminal group), the response time reported will include the transactions that take place while the end user is actually interacting with the desired application. The response time reported is still *end-to-end*, i.e. the transit time out to the real terminal is included in the network transit time. Please see the *End-to-End Response Time Feature (ETE) Reference Manual* for detailed information regarding MSMs and ETE's MSM support.

In order for OMEGAMON II to monitor a session for response time, the session's PLU (application) must reside on the same VTAM domain as OMEGAMON II (and ETE). One exception to this rule exists: when the session is using a properly configured MSM, the PLU of the virtual session may reside on the same domain, cross-domain or cross-net. When monitoring a session that is using this rule, the time that it takes for the transaction to be sent from the MSM host to the application host will be reflected in the host transit time of the response time calculations.
How OMEGAMON II Collects Response Time Data

End-to-End response time is the amount of time between the user's pressing a key (Enter, F1 through F24, PA1, PA2, PA3, or Clear) and receiving a response at the terminal. If you started a stopwatch when the user pressed Enter, and you stopped it when the terminal received the application's first response to the user's request, the stopwatch time would be the end-to-end response time of that request.

When calculating average response time for a group, OMEGAMON II uses the total accumulated transit time for all subordinate devices divided by the total PIU count for the group.

To measure end-to-end response time, OMEGAMON II places its response time monitor inside one of the VTAM SNA layers. In this location the monitor can time all SNA traffic that flows through VTAM. OMEGAMON II captures end-to-end response time for applications that use either the definite response protocol or the exception response protocol.

**Definite Response Protocol**

Under the *definite response* protocol, the application asks the terminal controller to respond to transmitted data by indicating whether or not the transmission was successful. The application must then wait for the controller's response before continuing. Because the controller responds to all transmissions, end-to-end response time is relatively easy to monitor under the definite response protocol.

**Exception Response Protocol**

Under the *exception response protocol*, the application asks the controller to respond only if an error occurs during transmission of data to the terminal. Because end-to-end response time can be measured only for transactions that require a response from the controller, the response time monitor must turn on definite response for applications that use the exception response protocol. Once it has measured the response time, the monitor discards the definite response before it flows to the application. Thus, the application never sees the definite response and is not even aware that a definite response has been elicited.
How OMEGAMON II Calculates Response Times

From its position inside VTAM, the response time monitor can measure the time between SNA events. The stopwatch starts when the request flows through VTAM toward the application. The watch stops when VTAM receives the definite response from the terminal controller. Only one portion of end-to-end response time cannot be captured directly and must be estimated: it is the time before the user's request reaches VTAM, $t_1$ minus $t_0$. See the following figure.

In most cases, the amount of time a request takes to flow from the terminal to VTAM ($t_1$ minus $t_0$) approximately equals the amount of time the definite response takes to flow from the controller to VTAM ($t_6$ minus $t_5$). This is true because all definite responses and most requests contain little data. Therefore, OMEGAMON II calculates end-to-end response time as ($t_6$ minus $t_1$).

Figure 82. Calculating Response Time

- End-to-end response time = $(T_6 - T_1)$
- Host response time = $(T_4 - T_1)$
- Network response time = $(T_6 - T_4)$
How OMEGAMON II Counts PIUs

When the information transmitted is longer than the receiving device type can accept, VTAM chains together several PIUs in order to accomplish the following:

- keep the information together
- accommodate the device

For inbound or average inbound PIUs, each PIU is counted separately, whether or not there is chaining.

For outbound or average outbound PIUs, several PIUs chained together are counted as only one PIU.

Support for Multisession Managers

OMEGAMON II, in conjunction with the End-to-End Response Time Feature (Version 500 or later), provides complete response time data for sessions established through multisession managers such as CL/SUPERSESSION. When monitoring an application or application group, OMEGAMON II displays the names of the real network terminals that accessed the application. Thus, instead of showing the session manager accessing the application, OMEGAMON II shows the actual terminals accessing the application. Refer to the Multi-Session Manager Interface chapter in the End-to-End Response Time Feature (ETE) Reference Manual for more information.

OMEGAVIEW Considerations

If you use OMEGAVIEW, you want the response time profile used in OMEGAVIEW to be the same as the response time profile used in a zoomed to OMEGAMON II session. You zoom to an OMEGAMON II session to investigate response time problems that were flagged in OMEGAVIEW.

If your product administrator defined a response time profile for the OMEGAVIEW collector session user ID, any user who zooms into OMEGAMON II automatically operates under the same profile as the collection session.

For more administrator information, see “OMEGAVIEW Considerations” on page 339.
Response Time Status Light

The text within the Response Time status light on the main status panel shows you the status of the OMEGAMON II Response Time facility and the End-to-End Response Time Feature as follows:

**Critical**  Red. Monitored terminal or application groups have exceeded their specified critical response time threshold.

**Warning**  Yellow. Monitored terminal or application groups have exceeded their specified warning response time threshold.

**Normal**  Green. Monitored terminal and application groups are responding below their warning thresholds.

**Idle**  Turquoise. Monitoring of terminal or application group response time is inactive.

**N/A**  Turquoise. End-to-End Response Time Feature not installed, terminated, or abended. To restart ETE and OMEGAMON II, see the *OMEGAMON II for VTAM Configuration and Customization Guide*.

**Disabled**  Turquoise. ETE must be enabled by a NAM command. See the *OMEGAMON II for VTAM Configuration and Customization Guide*.

**Error**  Turquoise. Internal error. Call Customer Support for assistance.

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
How to Obtain Response Time Information

The first time you looked at the main status panel after the response time feature was installed and enabled, you probably saw that the Response Times status light was turquoise and contained Idle. In contrast with the other monitoring facilities in the product, the response time monitor is idle by default. To monitor response times, you must first designate a resource or application group to monitor, and then activate monitoring.

Adding a Resource or Application to Monitor

To begin monitoring response times, follow these steps.

1. On the main status panel, enter S next to Response Times. The Average Response Time panel appears with asterisks in all of its columns, indicating that no resources or applications have yet been designated for monitoring.

2. In the entry field next to the row of asterisks, enter A (Add). The Add a Resource or Application Group pop-up appears as shown in the following figure.
The page contains a table and some text explaining how to use it to monitor response time. The table is as follows:

<table>
<thead>
<tr>
<th>Resource</th>
<th>SA</th>
<th>VR</th>
<th>TP</th>
<th>LUs</th>
<th>PIUs</th>
<th>Host</th>
<th>Netwrk</th>
<th>Total</th>
<th>Cond</th>
</tr>
</thead>
<tbody>
<tr>
<td>a *</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

The text explains how to add a resource or application group to monitor, including the fields:
- **Resource or group name**: Identify the resource, group of LUs, or application group you want to monitor. Use wildcard characters * and ? to group similarly named (generic) terminals or applids only.
- **Type**: Identify the group as one of the following:
  - A: Application group
  - T: Terminal group
  - N: NCP group
  - L: SDLC line group
  - P: SDLC PU group

The document also includes a section titled "Figure 83. Adding a Resource or Application to Monitor" and a paragraph explaining the steps to complete the pop-up.
Group description
This optional description appears on response time panels instead of group name. It may be a department name or location which is more meaningful than the generic group specification. For example, all the terminals in the Payroll department belong to generic terminal group L616*. Enter Payroll in this field to display Payroll as the resource instead of L616* on response time panels.

Force definite response
To force definite response for applications that do not normally run in definite response mode, enter Y. If an application does not normally run in definite response mode and you do not force definite response, OMEGAMON II cannot monitor response times for terminals connected to that application. If the application is already running in definite response mode, specifying Y here does not cause any problem.

Warning threshold
OMEGAMON II displays a yellow status light when total response time is equal to or greater than the threshold you specify here, and less than the critical threshold set in the next field. Specify the threshold in tenths of a second; for example, 20 for two seconds. The default is 5 (that is, 0.5 second).

Critical threshold
OMEGAMON II displays a red status light when total response time is equal to or greater than the threshold you specify here. Specify the threshold in tenths of a second; for example, 50 for five seconds. The critical threshold must be greater than the warning threshold. The default is 10 (that is, 1 second).

Threshold applies to
The response time thresholds established for a group may be applied to the host (H), network (N), or total (T) response time components. The default is T, for total response time.

Start group at logon
To start monitoring automatically as soon as you log onto OMEGAMON II, enter YES here. Otherwise, you will have to start monitoring by entering R (Start) on the Average Response Time panel each time you logon.

4. When you have completed the Add a Resource or Application Group pop-up, the Average Response Time panel, as in the following figure, displays the resource or application group you just added.
**Activating Monitoring**

Monitoring starts when you enter action code R (for Start) next to the resource or group name on this panel, as shown below.

![Panel Showing NCP Resource Group Added](image)

When you first activate monitoring for a group of terminals, OMEGamon II displays average response times across the group, rather than response times for the individual terminals. The number in the column headed LUs (10 in the example) is the total number of terminals in the group (for an application group, the number of LUs in session with the application or application group is displayed). The number in the column headed PIUs (546 in the example) is the total number of PIUs in the transactions monitored.
**Listing LU Response Times**

To view individual response times for all the LUs (terminals) in the group, enter **L** (for List) next to group name. The display expands to show individual response times and to identify the destination subarea, virtual route number, and transmission priority of each terminal's session.

![Average Response Time Panel Showing Individual LUs in Groups](image)

---

**Figure 85.** Average Response Time Panel Showing Individual LUs in Groups

---

---

---
**Displaying Exceptions**

You can also choose to display only the LUs (terminals) that show response time problems. To do so, enter X (for Exceptions) to the left of the group name. For example, if you enter X next to **NCP10Y** in the figure above, the resulting display shows average response times for the NCP group, and individual response times for LUs L1650100 and L1652290 (the two LUs with red status lights). If L1650100's response time improved, it would disappear from the display; if its response time lessened, its status light would turn yellow.

**Collapsing the List**

To collapse a list of LUs back into a one-line group report, enter U (for Unlist) next to the group name.

**Deactivating Monitoring**

To stop monitoring a group, enter P next to the group name. The group name still appears on the panel, but the status light displays **Idle**.

**Starting at Logon**

Your group definitions are retained when you log off. The next time you log on, the group will be started automatically if you have specified **YES** for **Start group at logon** when the group was created. Otherwise, you activate monitoring by entering R next to each resource or group you want to monitor.

**Deleting a Definition**

You can delete a group definition by entering D next to it.

**Changing a Definition**

If you want to change a group or resource's specifications, enter C next to it. Enter your changes on the pop-up that appears.
Viewing Sessions

For an alternate view of the response time data, press F4 for Sessions. The following panel appears.

<table>
<thead>
<tr>
<th>Resource</th>
<th>GT/SESSP</th>
<th>AvIPIU</th>
<th>AvOPIU</th>
<th>Last H</th>
<th>Last N</th>
<th>Last T</th>
<th>Cond</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCP10Y</td>
<td>NCP</td>
<td>10.6</td>
<td>12.8</td>
<td>2.3s</td>
<td>2.7s</td>
<td>5.0s</td>
<td>Critical</td>
</tr>
<tr>
<td>L1650100</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>1.0s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Warning</td>
</tr>
<tr>
<td>L1652290</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Critical</td>
</tr>
<tr>
<td>L1651000</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>2.3s</td>
<td>2.7s</td>
<td>5.0s</td>
<td>Critical</td>
</tr>
<tr>
<td>L1651002</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Warning</td>
</tr>
<tr>
<td>L1652395</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>2.3s</td>
<td>2.7s</td>
<td>5.0s</td>
<td>Critical</td>
</tr>
<tr>
<td>L1651003</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Warning</td>
</tr>
<tr>
<td>L1651004</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Normal</td>
</tr>
<tr>
<td>L1651005</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Normal</td>
</tr>
<tr>
<td>L1651006</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Normal</td>
</tr>
<tr>
<td>L1651007</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Normal</td>
</tr>
<tr>
<td>R617</td>
<td>SDLC</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Normal</td>
</tr>
<tr>
<td>R617A20</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Normal</td>
</tr>
<tr>
<td>L620A00</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Normal</td>
</tr>
<tr>
<td>TSO*</td>
<td>APPL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Normal</td>
</tr>
<tr>
<td>ATERM010</td>
<td>TERMINAL</td>
<td>10.6</td>
<td>12.8</td>
<td>0.1s</td>
<td>0.8s</td>
<td>2.7s</td>
<td>Normal</td>
</tr>
</tbody>
</table>

Command ===> ___________________________________________________________________
F1=Help  F2=Keys  F3=Exit  F4=Routing  F5=Refresh  F6=Console  **=Bkwd  **=Fwd
F9=Retrieve  F10=Action Bar  F11=Print  F12=Cancel  F15=Status Display
F17=Clear counts

Figure 86. Most Recent Response Time Panel Showing Sessions View

The Most Recent Response Time panel displays session partners as well as information on message sizes and response time data for the last transaction that took place, including:

- Group type (GT) for a specific group. The group types can be TERMINAL, APPL, NCP, SDLC, or PU.
- Session partner (SESSP) for a specific terminal.
- Average inbound (AvIPIU) and outbound (AvOPIU) PIU size in bytes.
- Last host, last network, and last total response time.

You can use this display for problems requiring the response time of the last transaction, rather than the average response time.
Obtaining Resource Analysis

You can use action code S to obtain resource analysis for a selected LU.

Navigating to the NCP Component

If a session on the Average Response Time or Most Recent Response Time panel belongs to an NCP group (NPC, line, or PU), you can use action code N (NCP performance) to navigate directly to a corresponding panel in the NCP performance component as follows:

- For an NCP-attached terminal, you go to the LU Resource Summary.
- For an NCP, you go to the NCP Statistics Summary.
- For a line, you go to the LU Status for Line panel.
- For a PU, you go to the LU Status for PU panel.

For more information about the NCP component, see the OMEGAMON II for VTAM NCP Monitoring Guide.

Highlighting Groups

On the Average Response Time and Most Recent Response Time panels, you can use the RT command to highlight the appearance of each group by changing the color of indented session rows from white to blue. Do the following:

1. Press F9 to put the cursor on the command line.
2. Enter RT.
3. Press F5 to refresh the panel.

Refreshing Response Time Displays

Either of two methods refresh the response time panels and display response time data from the latest transmissions:

1. Press F5 to refresh the panel.
2. To automatically refresh response time panels:
   a. Enter OR (for Options and Autorefresh) in the action bar entry field.
   b. Enter YES in the Autorefresh Active field.
   c. Specify an interval between 10 and 3600 seconds in the Autorefresh Seconds field.
Clearing Counts

You can reset the response time numbers, PIU sizes, and PIU counts displayed by the response time panels by pressing F17 (Clear Counts). These values become zeros and then begin accumulating again.

How Sessions Are Routed

To solve response time problems, you often need to know not only which terminals are having poor response time, but also how those terminals' sessions are being routed and which applications are their session partners. If most or all terminals with response time problems are in sessions that share the same virtual route, for example, you might improve response time by changing some of the terminals' class of service.

Summarizing Subareas

You can view a response time summary, broken down by destination subarea, by selecting Subarea Summary from the Goto pull-down. The summary covers only the terminals you are currently monitoring, as shown in the following figure.

```
<table>
<thead>
<tr>
<th>SA</th>
<th>Name</th>
<th>LUs</th>
<th>PIUs</th>
<th>Host</th>
<th>Network</th>
<th>Total</th>
<th>Cond</th>
</tr>
</thead>
<tbody>
<tr>
<td>_2</td>
<td>CCCDRM02</td>
<td>7</td>
<td>104</td>
<td>0.2s</td>
<td>0.2s</td>
<td>0.4s</td>
<td>Warning</td>
</tr>
</tbody>
</table>
```

Figure 87. Response Time Summary by Subarea
Summarizing Virtual Routes for a Subarea

To see a response time summary by virtual route, enter S to the left of the destination subarea that interests you. The following panel appears.

---

Command ===>
F1=Help  F2=Keys  F3=Exit  F5=Refresh  F6=Console  **=Bkwd  **=Fwd  F9=Retrieve  
F10=Action Bar  F11=Print  F12=Cancel  F15=Status_Display  F17=Clear counts
---

Figure 88. Response Time Summary by Virtual Route

In this panel, all terminals with response time problems are in sessions that use Virtual Route 0 (VR0) and Transmission Priority 1 (TP1). Response time might improve if some sessions used TP0 or if some sessions used a different virtual route.
Summarizing LUs for a Virtual Route

You can break down the summary even further by entering S to the left of the virtual route that interests you. The following panel appears.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Session</th>
<th>TP</th>
<th>PIUs</th>
<th>Host</th>
<th>Netwrk</th>
<th>Total</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTERM001</td>
<td>TSOA</td>
<td>1</td>
<td>0</td>
<td>0.0s</td>
<td>0.0s</td>
<td>0.0s</td>
<td>Normal</td>
</tr>
<tr>
<td>LTERM002</td>
<td>TSOB</td>
<td>1</td>
<td>32</td>
<td>0.0s</td>
<td>0.1s</td>
<td>0.1s</td>
<td>Normal</td>
</tr>
<tr>
<td>LTERM004</td>
<td>TSOC</td>
<td>1</td>
<td>4</td>
<td>0.0s</td>
<td>0.3s</td>
<td>0.3s</td>
<td>Normal</td>
</tr>
<tr>
<td>LTERM006</td>
<td>IMSA</td>
<td>1</td>
<td>31</td>
<td>0.1s</td>
<td>0.2s</td>
<td>0.3s</td>
<td>Normal</td>
</tr>
<tr>
<td>LTERM007</td>
<td>IMSB</td>
<td>1</td>
<td>10</td>
<td>0.3s</td>
<td>0.2s</td>
<td>0.5s</td>
<td>Warning</td>
</tr>
<tr>
<td>LTERM009</td>
<td>CICS A</td>
<td>1</td>
<td>0</td>
<td>0.0s</td>
<td>0.0s</td>
<td>0.0s</td>
<td>Normal</td>
</tr>
<tr>
<td>LTERM010</td>
<td>CICS B</td>
<td>1</td>
<td>32</td>
<td>0.4s</td>
<td>0.2s</td>
<td>0.6s</td>
<td>Warning</td>
</tr>
</tbody>
</table>

Figure 89. Terminal Response Time by Virtual Route and Transmission Priority

This panel lists:

- terminals using the virtual route
- each terminal's session partner
- transmission priority of each session
- number of PIUs in the latest monitored transmission of each session
- response time data for each session

Historical Reports

If you have SAS installed at your data center, you can produce service-level reports of response time data for offline analysis. See the information about SAS reporting in the *OMEGAMON II for VTAM Historical Reporting Guide* and the *OMEGAMON II for VTAM Configuration and Customization Guide* for details.

If you have SAS/GRAPH installed, you can display color historical graphs of your response time data. The color graphs display the application and network response times across each day for each response time group defined to OMEGAMON II. See the *OMEGAMON II for VTAM Historical Reporting Guide* for information on how to use the color graphs facility.
Chapter Contents

Overview ............................................ 202
VTAM Trace Facility ............................... 202
VTAM Trace Status Light ......................... 203
Listing the Traces ............................... 204
Controlling the VTAM Trace Facility .............. 206
  Adding a Trace ................................ 207
  Starting the Trace ............................ 209
  Restarting the Trace .......................... 209
  Stopping the Trace ............................ 210
  Saving the Trace .............................. 210
Reviewing a Trace Definition ..................... 211
Showing the PIUs ................................ 212
Expanded PIU Display ............................ 214
Browsing the PIUs ............................... 215
Analyzing the PIUs .............................. 216
Displaying the TH Data .......................... 217
Displaying the RH Data .......................... 219
Displaying the RU Data .......................... 221
Displaying the Data Stream ....................... 223
Printing a Trace ............................... 225
Deleting a Trace ............................... 226
Trace Facility Component Navigation ............... 227
Overview

This chapter shows you how to use the OMEGAMON II VTAM Trace Facility which traces, searches for, analyzes, and displays VTAM Path Information Units (PIUs). The first section explains the concepts behind the trace facility. The remaining sections describe the actions you can take, how to navigate within the facility, and each of the panels you use.

VTAM Trace Facility

VTAM Trace is a diagnostic tool for solving network problems such as terminals disappearing from a network or locking up, lost messages or data, inconsistent results from programs, invalid data on displays, or logon failures. You can use the trace facility to search for and examine the VTAM PIUs being transferred.

The OMEGAMON II Trace Facility inspects the PIUs being passed through VTAM to the various components that make up a network. You can capture all PIUs for a session or for a pair of session partners. This facility formats and interprets the contents of the PIUs for direct online inspection, provides field-level help, and can search for a specified string or command.

There are two types of trace that you can request:

1. **Non-search Trace** captures a specified number of PIUs.
2. **Search Trace** searches for a specified character or hexadecimal string, or SNA command within a PIU.

You may display details of the PIUs in realtime, save the trace data in a file for future use, or print all or part of the trace results.

For details on network concepts and definitions, refer to IBM's VTAM publications.

*Note:* Since the trace facility depends on the End-to-End Response Time Feature to provide the PIUs, the End-to-End Response Time Feature must be installed and enabled. If the Response Time status light on the main status panel contains N/A (Not Available), ERROR, or DISABLED, you cannot use the trace facility to start new traces. See “Response Time Status Light” on page 187 for more information. It is not necessary to be measuring end-to-end response time, to use the trace facility. It's OK if the Response Time status light displays Idle.
VTAM Trace Status Light

The VTAM Trace selection is available on the main status panel.

<table>
<thead>
<tr>
<th>Buffer Pools</th>
<th>Response Times</th>
<th>VTAM Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>Normal</td>
<td>Historical</td>
</tr>
<tr>
<td>Virtual Routes</td>
<td>Warning</td>
<td>VTAM Trace Normal</td>
</tr>
<tr>
<td>TNSTATS: CTCs</td>
<td>Warning</td>
<td>VTAM Addr Space Warning</td>
</tr>
<tr>
<td>TNSTATS: NCPs</td>
<td>Normal</td>
<td>TCP/IP Critical</td>
</tr>
<tr>
<td>TNSTATS: Locals</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>NCP Monitor</td>
<td>Warning</td>
<td></td>
</tr>
</tbody>
</table>

Command ===>
F1=Help F2=Keys F3=Exit F5=Refresh F6=Console F9=Retrieve F10=Action Bar
F11=Print

Figure 90. OMEGAMON II for VTAM Main Status Panel with VTAM Trace Status Light

On this panel the VTAM Trace status light has the following values:

**Turquoise**  Idle. No traces are currently running.

**Green**  Normal. One or more traces are running.

**Yellow**  Warning. One or more traces have completed.

**Red**  Critical. One or more traces have terminated.

- because of insufficient storage or
- with missing PIUs caused by a surge in PIU flow

If more than one of the above conditions is true, the more critical status displays (turquoise is least critical and red is most critical).

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
Listing the Traces

Select VTAM Trace from the main status panel and press Enter. The VTAM Trace Facility panel displays a list of available traces.

---

Figure 91. VTAM Trace Facility Panel

This panel displays current trace status and lists the traces available for viewing.

The upper section of the panel describes the Trace Facility as a whole. The Trace status field is ACTIVE if a trace is in progress; or INACTIVE if no traces are running. The Number of traces active field shows the total number of active traces.

The remainder of the panel lists the available traces. Asterisks (*) indicate no traces or no data. The fields describing a trace are as follows:

**Trace ID** Unique name specified when the trace definition was added.

**Status** Current status of the trace as follows:

- **ACTIVE** Running and not wrapping.
- **ACT/WR** Running and wrapping.
INACT  Not started.

STOPPED Was stopped before completion.

SAVED  Was saved for access in subsequent OMEGAMON sessions.

ENDED  Terminated normally.

STORAGE Terminated abnormally because of a storage shortage.

MISSING Ended with PIUs missing because of a PIU flow surge.

PIUs Number of PIUs that were retained by the trace facility for viewing or printing. For non-search traces, the value of PIUs always equals the value of PIUs Seen and is limited by the value of Max.

For search traces, this number equals the number of PIUs Seen until the trace begins to wrap. A search trace wraps when the number of PIUs retained reaches the maximum value specified by Max. When the search trace wraps, each new entry in the trace table replaces the oldest entry. PIUs are limited by the value of Max, while the number of PIUs Seen increment until the search argument specified in the trace definition is matched.

For search traces, PIUs may actually exceed Max by up to five PIUs. To provide trace continuity, the trace facility records five PIUs beyond the matching PIU regardless of the Max setting.

Max  Maximum number of PIUs retained by the trace facility for viewing or printing. The actual number of PIUs retained may exceed Max by up to five PIUs for search traces only. You specify Max when you Add a trace definition with the A action code. The Max you specify may not exceed the maximum set by an Administrator in the Global Options selection on the Monitoring Options menu under the Options pull-down.

Seen Number of PIUs observed by the trace. For non-search traces which never wrap, this number always equals the number of PIUs retained and is limited by the value of Max. For wrapped search traces, this value exceeds the number of PIUs retained.

Description Comment that identifies the trace.
Controlling the VTAM Trace Facility

In a typical operation of trace, you first Add or define the trace. Then you Start collecting PIUs. You may Review the trace definition at any time. A trace ends normally if it either collects the maximum number of PIUs or it satisfies a search for a specified character or hexadecimal string, or SNA command. Also, you may Stop a trace before it completes. You inspect the trace results with the Show action.

**Note:** Traces are normally deleted when a session is ended.

You may preserve Ended or Stopped traces, between sessions, with the Save action. You specify the portions of the trace you want printed with the Print action. Finally, you may Delete a trace when it is no longer needed.

On the VTAM Trace Facility panel (see Figure 91 on page 204), you execute all actions either from the action bar or on the display panel. To use the action codes displayed above the list of traces, place the cursor in the entry field of the selected Trace ID and enter any one of the following actions:

- **S** Show details of the selected trace. Lists the PIU headers which you can then examine in more detail.
- **A** Add a new trace definition. Required before a trace is initiated.
- **D** Delete the trace definition. Removes the trace from this list.
- **R** Start running a trace that was previously defined by an add, or restart a trace that has completed.
- **P** Stop the trace immediately, before it completes.
- **V** Review the trace definition.
- **H** Save the trace in a file for access in subsequent OMEGAMON II sessions.
- **P** Print all or selected portions of an ended trace.

The following sections each describe an available action.
Adding a Trace

Use action code A to add a new trace definition. The Add a Session To Be Traced pop-up appears.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Goto</th>
<th>Options</th>
<th>Help</th>
</tr>
</thead>
<tbody>
<tr>
<td>KON</td>
<td>KONDPAD</td>
<td>Add a Session To Be Traced</td>
<td></td>
</tr>
<tr>
<td>Type the requested information, then press enter.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trace ID</td>
<td>Maximum number of PIUs</td>
<td>(1-500)</td>
<td></td>
</tr>
<tr>
<td>Network LU name</td>
<td>Partner LU name</td>
<td>(Optional)</td>
<td></td>
</tr>
<tr>
<td>RU string to be trapped</td>
<td>RU string format</td>
<td>C + (Hex/Char/SNA)</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>SNA category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Control</td>
<td>YES + (YES/NO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Session Control</td>
<td>YES + (YES/NO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data Flow Control</td>
<td>YES + (YES/NO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FM data formatted</td>
<td>YES + (YES/NO)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FM data unformatted</td>
<td>YES + (YES/NO)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 92. Add a Trace Pop-up

Complete the Add a Trace pop-up as follows:

**Trace ID** Unique 1- to 8-character identifier for the trace.

**Maximum number of PIUs**

Maximum number of PIUs to be retained by the Trace Facility for viewing or printing. Allowable values display in parenthesis. The maximum number is set by your system administrator through the Options pull-down.
**Session Partners**

Session to be monitored by the trace:

- Network LU name. This LU name is required and will have its data flow traced.
- Partner LU name (Optional). Limits the trace to the traffic between the session partners specified so that the scope of the trace narrows.

**RU string to be trapped (optional)**

String to search for in the PIU. There are two parameters for this search:

- RU string format. Format of the string to be searched for: hexadecimal (H), character (C), or SNA command (S). The default is character format (C).
- RU string. Actual string to be trapped. The string must be entered in the format specified in RU string format.

*Note:* The trace can find a search string only if it is completely contained within a PIU. Also, be aware that the character search is case-sensitive. Wherever you specify uppercase characters, the search looks only for uppercase characters and wherever you specify lowercase, the search looks only for lower case.

**Description**

Identify or explain the trace.

**SNA category**

Enter **YES** or **NO** to specify whether or not to retain the following types of network data:

**Network Control**

Requests and responses that affect network components.

**Session Control**

Commands and responses that affect sessions.

**Data Flow Control**

Requests and responses that control session flow.

**FM data formatted**

Function management data to be transferred to the LUs that contains FM headers.

**FM data unformatted**

Function management data to be transferred to the LUs without FM headers. This is the default assumed if you specify NO for all data types.
Starting the Trace

When you use the A action code, the trace definition is created but the trace is not yet activated. Use action code R to start the trace running. The R (Start) action starts collecting PIUs. Once started the trace runs until one of the following happens:

- The trace collects the maximum allowed PIUs.
- The trace traps a specified RU string and collects 5 more PIUs.
- The trace is explicitly stopped.

Restarting the Trace

You can restart a trace that has completed. Enter action code R to restart a trace that is no longer active. The restart pop-up appears.

![Figure 93. Restart a Trace Pop-up](image-url)
On the restart pop-up you can do any of the following:

1. Press Enter to rerun the trace with the same parameters. The new trace output will replace the existing trace output.

2. Modify any of the parameters shown and rerun the trace using these parameters. The new trace output will replace the existing trace output.

3. Rerun the trace with the same or different parameters, but save the output under a new trace ID so that the original trace output is preserved.

Restarting a trace resets the status. A restarted trace will be deleted at session termination, whether or not the original trace was saved. You must explicitly save the new trace if you want to preserve it across OMEGAMON II sessions.

**Stopping the Trace**

Use action code P to stop the trace. A stopped trace appears as **Stopped** in the status field of the Trace Facility panel. A stopped trace may not be restarted.

**Saving the Trace**

Use action code H to save the trace data in the Tables Database and change the trace status to **Saved**. To view a trace in subsequent OMEGAMON II sessions, you must save the trace.
Reviewing a Trace Definition

Use action code V to review a trace definition. You can inspect a trace definition through a view-only pop-up.

![Trace Definition Pop-up](image)

**Figure 94. Review a Trace Definition Pop-up**
**Showing the PIUs**

Enter action code 5 (Show Details) next to a selected trace on the Trace Facility panel to show a summary of the trace's PIU headers. The Trace ID and Description fields identify the trace. PIU headers are listed in the order in which they were captured, so that the most recent PIU is at the bottom of the trace.

---

<table>
<thead>
<tr>
<th>Seq</th>
<th>PIU Type</th>
<th>Origin</th>
<th>Dest</th>
<th>RH</th>
<th>RU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DATA</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>2</td>
<td>DATA</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>3</td>
<td>+RSP</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>4</td>
<td>DATA</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>5</td>
<td>DATA</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>6</td>
<td>+RSP</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>7</td>
<td>DATA</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>8</td>
<td>DATA</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>9</td>
<td>+RSP</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>10</td>
<td>DATA</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>11</td>
<td>DATA</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>12</td>
<td>+RSP</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
<tr>
<td>13</td>
<td>DATA</td>
<td>M2VTGV18</td>
<td>OMVTAMG</td>
<td>/zerodot38</td>
<td>F1C3114</td>
</tr>
</tbody>
</table>

---

Command ===>

F1=Help F2=Keys F3=Exit F4=Expand F5=Refresh F6=Console **=Bkwd F8=Fwd F9=Retrieve F10=Action Bar F11=Print F12=Cancel F15=Status_Display

---

**Figure 95. Condensed PIU Entries Panel**
Each PIU row consists of

**Starting Time**  Local date and time the first PIU was traced.

**Ending Time**  Local date and time the last PIU was traced.

**Seq**  Logical sequence number of the PIU in collection order.

**PIU Type**  Type of PIU being sent.

**Origin**  Originating node of the PIU.

**Destination**  Destination node of the PIU.

**RH**  Request/response header data.

**RU**  First 18 bytes of the request/response unit data.

A trace usually contains multiple PIUs. Press F8 to scroll forward through the listed PIU headers, or press F7 to scroll backward.

Press F4 (Expand) for an expanded display that shows for each PIU

- the complete TH
- the complete RH
- the first 40 bytes of the RU
Expanded PIU Display

You can use F4 to toggle between the expanded and condensed display of trace entries. An example of an expanded display is shown in the following figure.

Figure 96. Display Trace Entries Panel
To help you browse through a trace's PIU headers, use the **Browse** choice on the action bar. The Browse pull-down displays a menu of browse options to scroll to a specified position within the listed PIUs. The fastest way to access a browse option is to enter the fastpath in the action bar entry field. You can enter any of the following browse option fastpaths:

- **BT**: Scrolls to the PIU at the top of the list.
- **BB**: Scrolls to the PIU at the bottom of the list.
- **BS**: Scrolls to the PIU containing the search string in a search trace.
- **BC**: Scrolls to the PIU containing a character string that you specify.
- **BH**: Scrolls to the PIU containing a hexadecimal string that you specify.
- **BP**: Scrolls to the PIU containing the previous occurrence of the last search string specified.
- **BN**: Scrolls to the PIU containing the next occurrence of the last search string specified.
- **BM**: Scrolls to the PIU number that you specify.
- **BF**: Scrolls to the PIU of the specified PIU type, which may be an SNA command

You can choose Browse from the action bar on three trace panels:

- Display Trace Entries (see the previous figure)
- RU Trace Analysis (see Figure 99 on page 221)
- Data Stream Analysis (see Figure 100 on page 223)
Analyzing the PIUs

If you are viewing a successful search trace, the RU portion of the PIU that is displayed in yellow contains the search string.

After deciding which PIU interests you, you can examine the trace data in more detail. On the Display Trace Entries panel (see previous figure), next to the PIU header, enter any one of the following action codes:

T Displays the TH data.
R Displays the RH data.
U Displays the RU data. For search traces, the search string is highlighted in yellow within the RU display.
D Displays the RU data in 3270 data stream format.

On formatted analysis displays, you can get help for elements or commands within the PIU. Position the cursor to the formatted field and press F1 for Help.

The following sections discuss each of the above actions.
Displaying the TH Data

Select action code T to display the transmission header (TH) data, as shown in the following figure.

| TIME= 11/18/91 14:31:5/zerodot.8649/zerodot3 TSOG <-- CCCCMM25 | 1 |
| RH= /zerodotB8/zerodot/zerodot/zerodot RU= /zerodotB8/zerodot/zerodot/zerodot RU= ... | |
| TIME= 11/18/91 14:31:5/zerodot.8649/zerodot3 TSOG <-- CCCCMM25 | 1 |
| RH= /zerodotB8/zerodot/zerodot/zerodot RU= /zerodotB8/zerodot/zerodot/zerodot RU= ... | |

---

Figure 97. TH Trace Analysis Panel
This panel is a detailed analysis of the transmission header (TH) data contained in the PIU header. The top portion of the panel displays the PIU header and the bottom portion of the panel formats the elements within the TH. The PIU header is that same as that displayed on the Display Trace Entries panel.

There are thirty-two fields which correspond to individual TH elements. There is field-level help for each TH element. Place the cursor on a TH element and press F1 for Help. When field help is selected, the corresponding byte offset of the field in the PIU header is highlighted in yellow so you can relate the TH data displayed with its physical location in the TH.

You can navigate to the other analysis displays through the Goto pull-down or by returning to the PIU Trace Entries display and entering an action code (R for RH analysis, U for RU analysis, or D for Data stream analysis).

This panel provides double scrolling. To select another PIU header for display, you can scroll backward through the PIUs for the current trace with F21 (Prev) and forward with F22 (Next). To view more elements, you can scroll backward through the current PIU with F7 (Bkwd) and forward with F8 (Fwd).
Displaying the RH Data

Select action code R to display the request/response header (RH) data.

---

Figure 98. RH Trace Analysis Panel
This panel is a detailed analysis of the request/response header (RH) data contained in the PIU header. The top portion of the panel displays the PIU header and the bottom portion of the panel formats the elements within the RH. The PIU header is the same as that displayed on the Display Trace Entries panel.

There are 24 fields which correspond to individual RH elements. There is field-level help for each RH element. Place the cursor on an RH element and press F1 for Help. When field help is selected, the corresponding byte offset of the field in the PIU header is highlighted in yellow so you can relate the RH data displayed with its physical location in the RH.

You can navigate to the other analysis displays through the Goto pull-down or by returning with F3 to the PIU Trace Entries display and selecting by action code (T for TH analysis, U for RU analysis, or D for Data stream analysis).

This panel also provides double scrolling. You scroll backward and forward through the PIUs for the current trace with F21 (Prev) and F22 (Next). You scroll backward and forward through the RH elements in the current PIU with F7 and F8.
Displaying the RU Data

Select action code U to display an analysis of the request/response unit (RU) data.

---

**Figure 99. RU Trace Analysis Panel**

The upper portion of this panel displays the PIU header. The PIU header is the same as that shown on the Display Trace Entries panel.

The bottom portion of the panel displays:

- **Off**: Hexadecimal offset into the RU.
- **RU Data Hex**: RU data in hexadecimal format.
- **RU Data Character**: RU data in character format.

When a search trace successfully completes, the search string is highlighted in yellow within the RU that contains the string. If you specified a character-format search string, the string is highlighted within the RU Data Character area. Hexadecimal-format search strings are highlighted within the RU Data Hex area.
To quickly locate a search argument within the matching RU, first scroll through the PIU headers on the Display Trace Entries panel to locate the PIU containing the search string. The RU containing the search string is displayed in yellow on the Display Trace Entries panel. Next, enter the U (RU) action code to display the complete RU.

The RU Trace Analysis panel provides double scrolling. You can scroll through the PIUs with F21 (Prev) and F22 (Next), and you can scroll through the RU data for the current PIU with F7 (Bkwd) and F8 (Fwd).

You can navigate to the other analysis displays by using the Goto pull-down or returning to the Display Trace Entries panel with F3 and entering action codes.
Displaying the Data Stream

Select action code D to display the RU data in 3270 data stream format.

---

Command ===>
F1=Help  F2=Keys  F3=Exit  F6=Console  F5=Refresh  **=Bkwd  ***=Fwd  F9=Retrieve
F10=Action Bar  F11=Print  F12=Cancel  F15=Status_Display  **=Prev  F22=Next

Figure 100. Data Stream Analysis Panel
This panel is a detailed analysis of the RU data in 3270 datastream format. There is field-level help for the 3270 data elements. The top portion of the panel is the PIU header which is the same as that displayed on the Display Trace Entries panel.

The bottom portion of the panel presents the RU data which may consist of Function Management data, SNA commands, or orders. The column headings for the RU display depend on the type of PIU as follows:

- When PIU type is an actual SNA command, the column headings are:

  **ccc ccccc RU**
  
  Where cccccccc is one of the following, depending on the setting in the RH:
  
  – Function Management Data
  – Session Control
  – Data Flow Control
  – Network Control

  **Offset**
  
  Offset into the displayable hexadecimal data.

  **Hex Data**
  
  RU data in hexadecimal format.

- When PIU type is DATA the column headings are:

  **Cmds/Orders**
  
  Hexadecimal commands and orders which structure and define the data.

  **Description**
  
  Description of the commands and orders in the data.

  **3270 Display Data**
  
  Display character elements of the data.

There is field-level help for each of the command elements displayed except for write-structured commands. Position the cursor on a command and press F1 for Help.

This panel also provides double scrolling. You can scroll through the PIUs for the current trace with F21 (Prev) and F22 (Next) and through the data stream for the current PIU with F7 (Bkwd) and F8 (Fwd).

You navigate to the other trace analysis panels by using the Goto pull-down or by returning to the Display Trace Entries panel with F3 and then entering an action code.
**Printing a Trace**

Use action code **N** to print a trace report. The Print VTAM Trace Report pop-up appears.

![Print VTAM Trace Report pop-up panel]

**Figure 101. Print Trace Report Pop-up Panel**

Use this pop-up to print hardcopy of a trace that has been stopped, ended, or saved. Once you have entered which PIUs and which analyses to print, a SYSOUT dataset is allocated. The trace report appears on SYSOUT under the started task or jobname of the OMEGAMON II address space. The resulting trace report is fully formatted.

Complete the Print VTAM Trace Report pop-up as follows:

- **Range of PIU sequence numbers to print.** You are prompted with the full range of PIUs in the trace. You can modify these sequence numbers to limit the report to the PIUs of interest.

- **Types of analyses to print (TH, RH, RU, and/or Data Stream).** You can select any or all of the analyses to print.

If you do not select one of the analyses, only the PIU headers are printed.

To specify trace print options such as SYSOUT, number of copies, and destination, select the Options pull-down and then select Printer Options.
Deleting a Trace

Use action code D to delete a trace. Trace results are immediately removed from the listing of traces and are no longer available for viewing. Once deleted, the trace results may not be recalled.
Chapter 11.
VTAM Environment

Chapter Contents

Overview .............................................. 230
Tuning VTAM with OMEGAMON II .................. 230
VTAM Environmental Summary ..................... 231
Environmental Data ................................. 233
CSA Performance ..................................... 235
Paging Performance .................................. 237
I/O Distribution ...................................... 239
I/O Rates .............................................. 240
CPU Utilization ....................................... 241
Internal Trace Statistics ............................. 242
Internal Trace Data ................................... 244
User Exits ............................................. 245
SRT Information and Modeling Facility .......... 247
  Using the SRT Modeling Facility ................. 248
  SRT Frequency Distribution ....................... 250
Lock Analysis .......................................... 251
  Currently Acquired VTAM Locks Panel .......... 252
  Waiting for Lock Panel ............................ 254
  Dump Display of the PAB-containing Control Block 256
  Dump Display of PAB (Snapshot) ................. 257
  Dump Display of the Control Block Containing the 258
    Lockword ........................................ 258
  Dump Display of Lockword (Snapshot) ........... 259
  Dump Display of Storage at Resume Address .... 260
VTAM Constants ........................................ 261
  Obtaining Current VTAM Constants Specifications 261
  Resetting VTAM Constants Specifications .......... 263
VTAM Environment Component Navigation ......... 266
Overview

Although VTAM is a key component of the MVS operating system, it starts as a subsystem of MVS. Consequently, MVS treats VTAM as a program running in an address space, and subjects it to the same restrictions as other address spaces. In order to properly tune VTAM, it is important that you understand these restrictions.

This chapter provides procedures for using OMEGAMON II to examine VTAM and its environment. It explains the use of thresholds to control the status light displays and briefly describes each of the MVS resources monitored.

Tuning VTAM with OMEGAMON II

OMEGAMON II monitors and displays the data needed to tune VTAM. If the status light for VTAM Environment is green on the main status panel, VTAM is performing as expected with respect to the selected major MVS resources (CPU usage, PAGING rate, SIO rate, CSA allocation, and C24 allocation).

If the status light for VTAM Environment is yellow or red, a specified threshold has been exceeded. You can locate the source of the problem by entering S next to VTAM Environment. This will display a summary of VTAM performance data. From here you can also go to information about locks being held by VTAM processes.

The VTAM Environment analysis depends on thresholds set by your system administrator through the Monitoring Options selection on the Options pull-down. Refer to “VTAM Environment Options” on page 321 for information on setting and adjusting the environment thresholds.

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
VTAM Environmental Summary

The VTAM Environmental Summary panel displays VTAM performance data with respect to the MVS operating system. To view this panel select **VTAM Environment** from the main status panel.

---

**Figure 102. VTAM Environmental Summary Display**

This panel summarizes the network environment, trace options, user exits, and resource consumption.

You can access the panels shown in the rest of this chapter through selections on the Goto pull-down.

- Network environment is summarized in the following fields at the top:
  - **NET ID**: Network identification number.
  - **CDRM**: Cross Domain Resource Manager (CDRM) name.
  - **JOB**: VTAM job name.

For more information, select **Environment** from the Goto pull-down. The panel shown in Figure 103 on page 233 displays.

- Current VTAM Internal Trace (VIT) options are summarized in the **VIT OPTIONS** field. For more information, select **Trace statistics** or **VIT trace data** from the Goto pull-down. The panel shown in Figure 109 on page 242 or Figure 110 on page 244 displays.
- Currently installed global VTAM exits are summarized in the **USER EXITS** field. For more information, select **User exits** from the Goto pull-down. The panel shown in Figure 111 on page 245 displays.

- VTAM's performance for some of the major MVS resources.

  **CPU usage**  
  Sum of VTAM Task Control Block (TCB) and Service Request Block (SRB) time. For more information, select **CPU Utilization** from the Goto pull-down. The panel shown in Figure 108 on page 241 displays.

  **PAGING rate**  
  The sum of all VTAM private area, common area, and link pack area pageins. For more information, select **Paging Rates** from the Goto pull-down. The panel shown in Figure 105 on page 237 displays.

  **SIO rate**  
  The sum of I/Os per second to:
  - Network Control Program (NCP) controllers
  - Channel-to-channel (CTC) adapters
  - Local SNA controllers
  - Local non-SNA controllers
  - DASD devices
  - Other devices

  For more information, select **IO Distribution** and **IO Rates** from the Goto pull-down. The panels shown in Figure 106 on page 239 and Figure 107 on page 240 display.

  **CSA allocated**  
  The number of bytes of Common System Area (CSA) storage, above and below the 16-megabyte line, that are used by VTAM. For more information, select **CSA Utilization** from the Goto pull-down. The panel shown in Figure 104 on page 235 displays.

  **C24 allocated**  
  The number of bytes of CSA storage below the 16-megabyte line that are used by VTAM. For more information, select **CSA Utilization** from the Goto pull-down. The panel shown in Figure 104 on page 235 displays.

If you have administrator authority, you can set exception thresholds for the above resources. To view the current thresholds, select the Options pull-down from any OMEGAMON II panel and select **Monitoring Options**. Then, select **VTAM Environment**. For more information on setting exception thresholds, see “Monitoring Options” on page 309.

- Analysis of VTAM's Symbol Resolution Table (SRT), and percent of the SRT being used for each chain length. For more information, select **SRT**
**Analysis** or **SRT Distribution** from the Goto pull-down. The panels shown in Figure 112 on page 248 or Figure 114 on page 250 display.

### Environmental Data

When you select **Environment** from the Goto pull-down, the VTAM Environmental Data displays host-specific information about VTAM as shown below.

![Environmental Data Panel](image)

**Figure 103. VTAM Environmental Data**

This panel includes:

- Names and release levels that identify this VTAM to other VTAMs in the network:
  
  **CDRM Manager** Cross Domain Resource Manager name specified in VTAMLST(ATCSTRcc). The parameter is SSCPNAME.

  **Network name** Specified in VTAMLST (ATCSTRcc). The parameter is NETID.

  **VTAM release level** For example, VE42 specifies VTAM Version 4 Release 2.
MVS release level  For example, SP5.1.0 specifies MVS/ESA Release 5.1.

VTAM start options  Name of the VTAM startup parameter list used to initialize VTAM (ATCSTRcc).

VTAM config list  Name of the VTAM configuration parameter list used to initialize VTAM (ATCCONcc).

• Debugging aids that show where VTAM resides within MVS:
  – Name of the VTAM address space.
  – Address space number (ASID) of the VTAM address space.
  – Address Space Control Block (ASCB) address.

• Debugging aids that show how VTAM is identified within the network. You can determine the network address of VTAM by looking at:
  – VTAM (SSCP) subarea number.
  – VTAM (SSCP) element or network address.
  – Node type which may be:
    • Network
    • End
    • Interchange
    • Migration
    • Subarea

If it is a network or end node, subarea number and element address are ***NA*** because they do not apply.
VTAM uses the Common Storage Area (CSA) for many of its control blocks and all of its buffer pools. Most of the storage is above the 16-megabyte line. When you select **CSA Utilization** from the Goto pull-down, you see a summary of CSA performance information.

![Goto Options Help](image)

### CSA Performance Summary

<table>
<thead>
<tr>
<th>CSA Limit</th>
<th>NO LIMIT</th>
<th>Relative percentage of maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX CSA used</td>
<td>2,940,628</td>
<td>8.05%</td>
</tr>
<tr>
<td>CSA allocated</td>
<td>2,964,256</td>
<td>8.12%</td>
</tr>
<tr>
<td>CSA highwater</td>
<td>3,019,185</td>
<td>8.27%</td>
</tr>
</tbody>
</table>

### C24 Performance Summary

<table>
<thead>
<tr>
<th>C24 Limit</th>
<th>512,000</th>
<th>Relative percentage of maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAX C24 used</td>
<td>38,802</td>
<td>7.57%</td>
</tr>
<tr>
<td>C24 allocated</td>
<td>29,582</td>
<td>5.77%</td>
</tr>
<tr>
<td>C24 highwater</td>
<td>34,858</td>
<td>6.80%</td>
</tr>
</tbody>
</table>

The CSA Performance panel summarizes two important features:

1. The top box summarizes the total Common Storage Area (CSA) usage.
2. The bottom box illustrates the C24 (below the line) performance.

The CSA Performance panel, as in the previous figure, includes:

- **CSA and C24 limits**: Parameters CSALIMIT and CSA24 are specified in VTAMLST (ATCSTRcc). To compute the CSA upper boundary, VTAM uses the lesser of CSALIMIT or the available system CSA. If either CSALIMIT or CSA24 is set to zero, a **NO LIMIT** condition exists for that storage area and VTAM uses as much storage as necessary. The bar graphs represent the percentage of storage used with respect to what VTAM can allocate. The maximum storage is calculated only when you issue a D NET,BFRUSE VTAM command (releases prior to 4.3), or since the last recording.
interval (VTAM 4.3). You can issue the BFRUSE command in several ways:

- Press F6 (Console) to go to the VTAM console and enter the command.
- Enter the command from an MVS master console.
- Use an automated operator tool to automatically issue the command at timed intervals.

### Maximum CSA and C24

Used prior to the last D NET,BFRUSE (releases prior to VTAM 4.3) or since the last recording interval (VTAM 4.3). **MAX CSA used** and **MAX C24 used** both reflect the maximum storage VTAM had at any one time before the last D NET,BFRUSE command was issued or since the last recording interval. Prior to the first execution of the BFRUSE command, the field is zero.

### CSA and C24 allocated

Amounts currently in use.

### Highwater CSA and C24

Maximum used since the last D NET,BFRUSE was issued (releases prior to VTAM 4.3) or since the last recording interval (VTAM 4.3). **CSA highwater** and **C24 highwater** both reflect the maximum storage VTAM had at any one time since the last D NET,BFRUSE command was issued or since the last recording interval.

VTAM compares maximum and highwater, and if the highwater value is higher, replaces the maximum value with the highwater value. Then, VTAM replaces the highwater value with the allocated value.
Paging Performance

When you select **Paging Rates** from the Goto pull-down, you see paging-related information for the VTAM address space.

![Goto Options Help](image)

**Figure 105. VTAM Paging Performance**

This panel includes:

- **Working set sizes:**
  
  **Target** Number of bytes that the System Resources Manager (SRM) attempts to keep in real storage for VTAM. This number is specified in the PARMLIB dataset, in member IEAIPSxx. The parameter name is PWSS. (PWSS values are expressed as minimum and maximum page frames, not bytes.) The target working set size ensures that VTAM has enough real storage to perform well. If this value is too small, VTAM may page excessively. If it is too big, real storage may be wasted.

  **Current** Actual amount of real storage used by VTAM. It may be above or below the target working set size.
**Note:** Working set size refers to VTAM's private area storage only. It does not have CSA storage figured in. To get a better value of VTAM's total working set size, use buffer pool analysis and add together the:

- working set sizes
- fixed buffer pool sizes
- fixed buffer pool extent sizes

Do not add in the pageable pools. The result will be approximately equal to the total working set size.

- **Frames in use:**
  
  **Current**
  4K blocks of real storage currently in use by VTAM.

  **Current extended**
  4K blocks of real storage currently in use by VTAM that have an address greater than 16 Mb. 31-bit addressing must be used to access these frames.

- **Area page-ins.** The number of page-in operations that occurred during the sample time at the top of the panel. This is broken down by major sections of VTAM's storage map.

  **Private**
  Private area of MVS.

  **Common**
  Common area of MVS.

  **Link pack area (LPA)**
  MVS area where common modules are stored.

  **Total VTAM**
  Total of common and private page-ins.
I/O Distribution

When you select **I/O Distribution** from the Goto pull-down, you see information on I/O for the VTAM address space.

---

For each device class, this panel includes:

- number of start I/Os per second
- relative percentage of activity for that class
- where data is flowing from VTAM

This panel shows which components currently comprise VTAM's workload. From this breakdown, you can determine where tuning efforts might best be focused.

---

**Figure 106. VTAM I/O Distribution**

For each device class, this panel includes:

- number of start I/Os per second
- relative percentage of activity for that class
- where data is flowing from VTAM

This panel shows which components currently comprise VTAM's workload. From this breakdown, you can determine where tuning efforts might best be focused.
When you select **I/O Rates** from the Goto pull-down, you see I/O rates for the VTAM address space.

![I/O Rates Panel]

**Figure 107. VTAM I/O Rates**

For each device class, this panel includes:

- **Device**
  - List of the device types.

- **Count**
  - How many of each device type. This reflects the number of allocated NCBs and is always zero for DASD.

- **Total SIO Count**
  - Number of start I/O instructions per device type.

- **Delta SIO Count**
  - Number of start I/O instructions performed since the last Enter (the sampling interval displayed at the top of the panel).

- **SIO Rate per second**
  - Delta SIO count divided by the number of seconds.
When you select **CPU Utilization** from the Goto pull-down, you see VTAM's use of the CPU.

This panel includes:

- percentage of time that VTAM was in Task Control Block (TCB) mode
- percentage of time that VTAM was in Service Request Block (SRB) mode
- current VTAM CPU usage
- current CPU busy

You can use this panel to determine if CPU cycles are available to VTAM and to assess VTAM's relative consumption of the CPU resource.
Internal Trace Statistics

VTAM internal trace is a VTAM provided debugging facility that traces the flow of data into and out of VTAM. It can be started by VTAM initialization parameters or from a VTAM console. VTAM internal trace statistics describe VTAM internal traces, but not the traces started through the OMEGAMON II trace facility.

When you select Trace Statistics from the Goto pull-down, you see information on VTAM's internal trace statistics.

Figure 109. VTAM Internal Trace Statistics

If tracing is active, the trace options currently in use are displayed. If the trace is inactive and you want to start it, press F6 to go to the VTAM console.

Note: When using OMEGAMON II's response time feature, the VTAM internal trace must be active and PIU must be one of the trace options.
The trace information in the previous figure includes:

- Lists of the internal trace options that are enabled:
  - Startup
  - Current

- A list of VIT characteristics:
  - Status
  - Address
  - Size (entries)
  - Mode
    - if INTERNAL, data is accumulated to a trace table
    - if EXTERNAL, data is written to GTF
    - otherwise, INACTIVE

- VIT statistics:

  Wrap interval  Elapsed time between the two most recent VIT table wraps.

  Wrap rate  How fast the table wraps around, that is, the proportion of the VIT table filled per second.

  Wrap rate in entries per second  Current rate at which VIT trace entries are added to the VIT table, normalized per second.
Internal Trace Data

When you select **VIT Trace Data** from the Goto pull-down, you see VTAM internal trace data.

<table>
<thead>
<tr>
<th>Address</th>
<th>Type</th>
<th>VIT trace entry in hexadecimal (bytes 2 thru 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>/zerodot32EB/zerodot8/zerodot</td>
<td>QUE C502A084800031F95200332FE38800B46702CC9D58E3E2D903344560</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB0A0</td>
<td>DISP E2072A00800031F95200332FE38802CC9D58E3E2D903344560</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB0C0</td>
<td>QUE C5992A0040000E88EF02E38578B21D41003354A38E3E2D90344560</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB0E0</td>
<td>EXIT C932A00028031F95200332FE38821C7B1E8000000E2D903344560</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB100</td>
<td>RE 22222A000000039ABC0B005E9F02037F1C80000003020001D000000000</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB120</td>
<td>DISP E2076799000000E88EF02E38578B21D403354A38E3E2D90344560</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB140</td>
<td>PIU E4467994000003354A384000000000000000000000000100000000000011C000043</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB160</td>
<td>PIU2 E4205C30CC000609320C74C01000000000000000000000000000000000000000</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB180</td>
<td>QUE C599670048000E2963B0333F560821CA2EC03354A38E3E2D90344560</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB1A0</td>
<td>EXIT C93667000002802E88EF02E38578B21CA33000000000E2E2D90344560</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB1C0</td>
<td>DISP E2076799000000E2963B0333F5603354A38003354A38E3E2D90344560</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB1E0</td>
<td>EXIT C936700000100E2963B0333F560821C6C2C00000000E2E2D90344560</td>
<td></td>
</tr>
<tr>
<td>/zerodot32EB200</td>
<td>RE 23026700000038423C0002109203945FD80000003020001DC0000000</td>
<td></td>
</tr>
</tbody>
</table>

**Command ====>**
F1=Help  F2=Keys  F3=Exit  F5=Refresh  F6=Console  **=Bkwd  **=Fwd  F9=Retrieve
F10=Action Bar  F11=Print  F12=Cancel  F15=Status Display

Figure 110. VTAM Internal Trace Data

For the 20 most recent trace entries, this panel includes:

- address of the trace data
- type of trace entry
- bytes 2 through 31 of the trace entry

If the trace is inactive and you want it started, select **VTAM console** from the Goto pull-down and start it.

**Note:** This display shows updated information on a refresh when information in the VTAM internal trace header control block changes. On a lightly loaded system, or one with a large trace table, the trace table may not have wrapped since Enter or F5 was pressed. In those cases, the information displayed is not updated.
When you select **User Exits** from the Goto pull-down, you see VTAM user exit information. These exits are global in nature (one per VTAM). However ISTEXCPM, the Performance Monitor Interface (PMI), is a new exit in VTAM 4.3 that can have more than one instance.

### Goto Options Help

<table>
<thead>
<tr>
<th>Name</th>
<th>Module</th>
<th>Level</th>
<th>Description</th>
<th>Address</th>
<th>Type</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISTAUCAG</td>
<td><em><strong>NA</strong></em></td>
<td>Session Acct</td>
<td>00000000</td>
<td>STATIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTAUCAT</td>
<td><em><strong>NA</strong></em></td>
<td>Session Auth</td>
<td>00000000</td>
<td>STATIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTCMDMD</td>
<td><em><strong>NA</strong></em></td>
<td>Cmd Verify</td>
<td>00000000</td>
<td>DYNAMIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTEXCAA</td>
<td><em><strong>NA</strong></em></td>
<td>Session Mgmt</td>
<td>00000000</td>
<td>DYNAMIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTEXCCS</td>
<td><em><strong>NA</strong></em></td>
<td>Config Serv</td>
<td>00000000</td>
<td>DYNAMIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTEXCDM</td>
<td><em><strong>NA</strong></em></td>
<td>Dir Srv Mgmt</td>
<td>00000000</td>
<td>DYNAMIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTEXCPM</td>
<td><em><strong>NA</strong></em></td>
<td>PMI</td>
<td>/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot</td>
<td>DYNAMIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTEXCPM KONAMV00</td>
<td>00000500</td>
<td>PMI</td>
<td>80830300</td>
<td>DYNAMIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTEXCSO ISTEXCS</td>
<td><em><strong>NA</strong></em></td>
<td>SDDLU</td>
<td>85B3A0A0</td>
<td>DYNAMIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTEXVCU ISTEXVCV</td>
<td><em><strong>NA</strong></em></td>
<td>USERVAR</td>
<td>86265B08</td>
<td>DYNAMIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTPCUCWC</td>
<td><em><strong>NA</strong></em></td>
<td>VR Selection</td>
<td>00000000</td>
<td>DYNAMIC</td>
<td>INACT</td>
<td></td>
</tr>
<tr>
<td>ISTPCUCWC</td>
<td><em><strong>NA</strong></em></td>
<td>VR Window Sz</td>
<td>85D4620B</td>
<td>STATIC</td>
<td>INACT</td>
<td></td>
</tr>
</tbody>
</table>

Command ===> _________________________________________________________________

F1=Help F2=Keys F3=Exit F5=Refresh F6=Console F9=Retrieve F10=Action Bar
F11=Print F12=Cancel F15=Status Display

---

**Figure 111. VTAM User Exits (VTAM 4.3)**

The number of exits displayed varies depending on the version of VTAM you are monitoring. For each exit, this panel includes the following fields:

- **Name**: Eight-character name.
- **Module**: Module name or exit instance. Beginning with VTAM 4.3, multiple instances of some exits can be active at the same time.
- **Level**: Internal exit version or level identifier. *****NA***** means exit level is not coded in the exit.
- **Description**: Brief description of the exit.
<table>
<thead>
<tr>
<th>Address</th>
<th>Starting address. (All zeros indicates that no exit has been defined.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Possible values are</td>
</tr>
<tr>
<td><strong>STATIC</strong></td>
<td>Exit cannot be modified while VTAM is active.</td>
</tr>
<tr>
<td><strong>DYNAMIC</strong></td>
<td>Exit can be modified by issuing a MODIFY EXIT command from a VTAM operator console.</td>
</tr>
<tr>
<td><strong>Status</strong></td>
<td>Possible values are</td>
</tr>
<tr>
<td><strong>ACTIVE</strong></td>
<td>Currently in effect.</td>
</tr>
<tr>
<td><strong>PEND01</strong></td>
<td>Pending (VTAM 3.4.0 only).</td>
</tr>
<tr>
<td><strong>PEND02</strong></td>
<td>Pending an inactive state (VTAM 3.4.1 and above).</td>
</tr>
<tr>
<td><strong>PEND03</strong></td>
<td>Pending an inactive replace state (VTAM 3.4.1 and above).</td>
</tr>
<tr>
<td><strong>PEND04</strong></td>
<td>Pending an active replace state (VTAM 3.4.1 and above).</td>
</tr>
<tr>
<td><strong>PEND05</strong></td>
<td>Pending an active state (VTAM 3.4.1 and above).</td>
</tr>
<tr>
<td><strong>INACT</strong></td>
<td>Inactive.</td>
</tr>
</tbody>
</table>

If the exit is not active, no exit name appears on the VTAM Environmental Summary display. This display also indicates the functions that are enabled for the session management exit.

The ISTPUCWC load module is distributed by IBM in VTAMLIB. Therefore, you always see this module displayed whenever you install a new version of VTAM.

For help on a particular exit, position the cursor on the row describing the exit and press F1 (Help).
OMEGAMON II can display information about VTAM's Symbol Resolution Table (SRT). VTAM uses the SRT to translate symbolic node names into addresses. VTAM creates the table during initialization and updates it as new resources are added to the network.

OMEGAMON II monitors the SRT directory, which contains pointers to chains of network resource addresses. Each chain anchor occupies a slot in the SRT. SRT chain sizes range from zero, if a table slot contains no chain, to any positive integer, where the integer represents the number of network addresses on the chain.

In terms of network performance, short chain lengths are desirable. Shorter chain lengths generally result from a wider distribution of SRT slots in the SRT table.

The SRT size is set by a hashing algorithm that uses the value of the RACHSRT parameter at VTAM startup. The default value is 1499. However, you may be able to fine tune network performance by changing the value of RACHSRT. If your network SRT chain lengths are long, you can model proposed SRT values and verify the impact on the existing network load.

In developing a new RACHSRT parameter, be aware that the SRT distribution may change, particularly if large network components (such as NCPs) are activated and deactivated over the course of a day. This is because the SRT distribution is sensitive to the network naming conventions used. Thus, new proposed RACHSRT values should be modeled under all major network configurations in order to assure the anticipated result.

In tuning the SRT, the primary criteria is generally a reduction in the average chain length across all major network configurations. Although the chaining efficiency algorithm takes into consideration any wasted storage that may accrue from a large RACHSRT value, this waste is usually of lesser concern since the storage is allocated over the line in VTAM's private region.

In VTAM V4.1 and above, the RACHSRT parameter can be overridden with a startup option (ACTSTRcc) or with a MODIFY VTAMOPTS command while VTAM is running. See “Resetting VTAM Constants Specifications” on page 263.
Using the SRT Modeling Facility

To access the SRT modeling facility, select SRT Analysis from the Goto pull-down on the VTAM Environmental Summary display.

<table>
<thead>
<tr>
<th>Symbol Resolution Table parameters</th>
<th>Current</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRT size (in entries) . . . . . . .</td>
<td>1,499</td>
<td>0</td>
</tr>
<tr>
<td>SRT resource count . . . . . . . .</td>
<td>4,331</td>
<td>0</td>
</tr>
<tr>
<td>SRT chains . . . . . . . . . . .</td>
<td>1,412</td>
<td>0</td>
</tr>
<tr>
<td>SRT minimum chain length . . . . .</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>SRT maximum chain length . . . . .</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>SRT average chain length . . . .</td>
<td>3.06</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Performance Evaluation

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Current</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRT Distribution Percentage</td>
<td>94.19%</td>
<td>========================&gt;.</td>
</tr>
<tr>
<td>SRT Chaining Efficiency</td>
<td>44.96%</td>
<td>===========&gt; . . . . . . .</td>
</tr>
<tr>
<td>Model Distribution Percentage</td>
<td>/zerodot./zerodot/zerodot%</td>
<td>&gt;. . . . . . . . . . . . .</td>
</tr>
<tr>
<td>Model Chaining Efficiency</td>
<td>/zerodot./zerodot/zerodot%</td>
<td>&gt;. . . . . . . . . . . . .</td>
</tr>
</tbody>
</table>

Figure 112. Symbol Resolution Table (SRT) Analysis Panel

This panel displays the current SRT parameters and the model parameters. However, until you enter a value for RACHSRT, the model fields contain zeros.
To change the value of RACHSRT, select the Modeling pull-down.

Enter a new value for RACHSRT, which should be a prime number (press F2 to view the preceding and subsequent prime numbers).

When you press Enter, you can compare the effects of the model SRT values with the current SRT values as shown below. The modeling facility in no way affects the existing SRT table.

![Figure 113. VTAM SRT Analysis Panel with Model Values](image-url)
**SRT Frequency Distribution**

You can obtain current and model frequency distribution data on SRT chain lengths (ranging from 0–25 or greater) as shown below. Select **SRT Distribution** from the Goto pull-down.

<table>
<thead>
<tr>
<th>CH</th>
<th>Current SRT</th>
<th>Model SRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>107 7.13</td>
<td>266 13.14</td>
</tr>
<tr>
<td>1</td>
<td>307 20.48</td>
<td>608 30.05</td>
</tr>
<tr>
<td>2</td>
<td>326 21.74</td>
<td>599 29.60</td>
</tr>
<tr>
<td>3</td>
<td>399 26.61</td>
<td>357 17.64</td>
</tr>
<tr>
<td>4</td>
<td>225 15.01</td>
<td>149 7.36</td>
</tr>
<tr>
<td>5</td>
<td>100 6.67</td>
<td>37 1.82</td>
</tr>
<tr>
<td>6</td>
<td>27 1.80</td>
<td>6 0.29</td>
</tr>
<tr>
<td>7</td>
<td>8 0.53</td>
<td>1 0.04</td>
</tr>
</tbody>
</table>

Figure 114. SRT Frequency Distribution Panel
Lock Analysis

The VTAM lock analysis feature provides important information about locks currently held by various VTAM processes. It also identifies owners of the locks and the processes waiting for the locks.

When a problem in the VTAM network occurs, the lock analysis feature will help by identifying VTAM processes holding a lock and any processes waiting for locks.

For each acquired lock, you can display

- the lock name, level, and type (exclusive or shared)
- the control block containing the lockword itself
- the control block containing the Process Anchor Block (PAB) that holds a lock
- the name of the address space associated with the PAB
- all processes waiting for a particular lock

For each process waiting for a lock, you can display

- the summary of a lock being waited for
- the control block containing the lockword itself
- the control block containing the PAB waiting for a lock
- the name of the address space associated with the PAB
- storage at the resume address in the waiting VTAM module

To access the lock analysis feature, select **Lock Analysis** from the Goto pull-down on the VTAM Environmental Summary display.

*Note:* The lock analysis panels are display only. No data will be modified as a result of using this feature.
When you select **Lock Analysis** from the Goto pull-down on the VTAM Environmental Summary panel, a panel displays information about the VTAM locks that are currently held.

![Currently Acquired VTAM Locks Panel](image)

**Figure 115. Currently Acquired VTAM Locks**

For each acquired lock, this panel includes:

- **Lock Name**: The lock name as defined in the IBM VTAM Diagnosis manual. If the lock name is not identifiable, this field contains **UNKNOWN**.

- **Lock Level**: Each lock in VTAM has a level associated with it. This means that a process already holding a lock can only request a higher-level lock.

  The level hierarchy prevents a deadlock when two processes hold a lock, and each process requests a lock held by the other process. Possible values are 1 to 9.

- **Lock Type**: The type of lock. Each lock can be acquired either as shared (SHR) or exclusive (EXC). Any number of processes can hold a shared lock on a resource at the same time. If a lock is obtained as exclusive, no other process can obtain the lock on the resource until the exclusive lock holder releases it.
Lock Location  The name of the VTAM control block containing the lockword. Each VTAM lock is always located inside a VTAM control block.

If the control block is not identifiable, this field contains the address of the lockword.

PAB Location  The name of the VTAM control block containing the PAB. The PAB is always located inside another VTAM control block. Each lock is associated with a PAB. If the control block is not identifiable, this field contains the address of the PAB.

Address Space Name  The name of an address space associated with the process that acquired the lock.

Wait  The number of VTAM processes waiting for this particular lock.

To display more lock analysis data, use one of the following action codes.

W  Displays the list of VTAM processes waiting for locks, described on page 254.

L  Displays a dump of the control block containing the lockword, described on page 258.

P  Displays the control block containing the PAB, described on page 256.
Waiting for Lock Panel

To display the list of VTAM processes waiting for locks, use action code W (Waiting for lock) on the Currently Acquired VTAM Locks panel (Figure 115 on page 252).

<table>
<thead>
<tr>
<th>Actions</th>
<th>Goto Options Help</th>
</tr>
</thead>
<tbody>
<tr>
<td>_______</td>
<td>________________</td>
</tr>
<tr>
<td>KONDELWD</td>
<td>Waiting for QUEUE Lock</td>
</tr>
<tr>
<td>System: SYSH</td>
<td></td>
</tr>
</tbody>
</table>

**Lock Summary**

QUEUE lock is held as an exclusive lock by 1 VTAM process. The level of the lock is 9.

Select with a "/" or an action code. Lines 1 to 1 of 1

P=PAB Storage  R=Resume Address  L=Lock Storage

<table>
<thead>
<tr>
<th>Address Name</th>
<th>A.S. Name</th>
<th>Resume Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>/zerodot/zerodotBAE23/zerodot</td>
<td>ATCVT</td>
<td>CICSA /zerodot/zerodotD47A3E</td>
</tr>
</tbody>
</table>

Command ===>

F1=Help  F2=Keys  F3=Exit  F6=Console  **=Bkwd  **=Fwd  F9=Retrieve  F10=Action Bar  F11=Print  F12=Cancel  F15=Status Display

Figure 116. Waiting for a Lock

This panel includes the following information about the lock you selected on the Currently Acquired VTAM Locks panel (Figure 115 on page 252). (The data displayed in this panel is not refreshable.)

**Lock Summary**

The lock summary displays the number of processes holding a lock, the lock name, type, address, and level that represent the lock being waited for.

**PAB Address**

The address of the PAB.

**PAB Name**

The name of the VTAM control block containing the PAB. The PAB is always located inside another VTAM control block. Each lock is associated with a PAB.

If the control block is not identifiable, this field contains **UNKNOWN**.

**Address Space Name**

The name of an address space associated with the process that is waiting for the lock.

**Resume Address**

The location that a VTAM routine resumes executing after the lock is acquired.
To display more lock analysis data, use one of the following action codes.

**P** Displays the control block containing the PAB, described on page 256.

**R** Results in a dump display of storage at the resume address, described on page 260.

**L** Displays a dump of the control block containing the lockword, described on page 258.
Dump Display of the PAB-containing Control Block

To display the control block containing the PAB, use the P (PAB storage) action code on the Currently Acquired VTAM Locks panel (Figure 115 on page 252) or the Waiting for a Lock panel (Figure 116 on page 254).

![Command line]

Figure 117. Dump Display of the PAB-containing Control Block

The storage display is in dump format, which includes both hexadecimal and character representations of the data. Note the actual address and the offset from zero that correspond to each line of data. This panel includes:

**Address**

The actual starting address of this control block in memory.

**Offset**

The relative offset into the control block in hexadecimal format, starting from zero.

**Hex Data**

Displays the contents of the control block in hexadecimal format.

**Character Data**

Displays the contents of the control block in character format.

If the control block containing the PAB is not identifiable, then the panel displays the unknown control block from its beginning to the end of the PAB. In this case, the panel title displays **UNKNOWN** as name of the control block.

F4 serves as a toggle between a snapshot of the PAB contents at a lock analysis time (see Figure 118 on page 257) and the current contents of the control block containing the PAB.
**Dump Display of PAB (Snapshot)**

To display a snapshot of the PAB that existed at a lock analysis time, press F4 on the PAB-containing control block panel (Figure 117 on page 256).

---

**Figure 118. Dump Display of PAB at a Lock Analysis Time**

The storage display is in dump format, which includes both hexadecimal and character representations of the data. Note the actual address and the offset from zero that correspond to each line of data.

The data displayed in this panel is not refreshable, and shows the data previously acquired for the panel described on page 252.
Dump Display of the Control Block Containing the Lockword

To display the control block containing the lockword, use the L (Lock storage) action code from the Currently Acquired VTAM Locks panel (Figure 115 on page 252) or the Waiting for a Lock panel (Figure 116 on page 254).

<table>
<thead>
<tr>
<th>Address</th>
<th>Offset</th>
<th>Hex Data</th>
<th>Character Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>00AEB240</td>
<td>0000</td>
<td>07E98C68 00000000 083E18C8 00000000</td>
<td>.Z.........H....</td>
</tr>
<tr>
<td>00AEB250</td>
<td>0010</td>
<td>10321000 00000010 00000000 00000000</td>
<td>................</td>
</tr>
<tr>
<td>00AEB260</td>
<td>0020</td>
<td>00000000 00000000 00000000 00000000</td>
<td>................</td>
</tr>
</tbody>
</table>

Command ===>
F1=Help F2=Keys F3=Exit F4=Lock Snap F5=Refresh F6=Console **=Bkwd
**=Fwd F9=Retrieve F10=Action Bar F11=Print F12=Cancel F15=Status Display

Figure 119. Dump Display of the Control Block Containing the Lockword

The storage display is in dump format, which includes both hexadecimal and character representations of the data. Note the actual address and the offset from zero that correspond to each line of data.

If the control block containing the lockword is not identifiable, then the panel title displays UNKNOWN as the control block name. In this case, the panel displays 512 bytes of storage starting 256 bytes before the lockword address.

F4 serves as a toggle between a snapshot of the lockword content at a lock analysis time (see Figure 120 on page 259) and the current contents of the control block.
**Dump Display of Lockword (Snapshot)**

To display a snapshot of the lockword that existed at a lock analysis time, press F4 on the control block containing the lockword panel (Figure 119 on page 258).

```
<table>
<thead>
<tr>
<th>Address</th>
<th>Offset</th>
<th>Hex Data</th>
<th>Character Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>/zerodot/zerodotAEB258</td>
<td>/zerodot/zerodot/zerodot/zerodot</td>
<td>/zerodot7E6181/zerodot ... /zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot</td>
<td>................</td>
</tr>
</tbody>
</table>
```

Figure 120. Dump Display of the Lockword at a Lock Analysis Time

The storage display is in dump format, which includes both hexadecimal and character representations of the data. Note the actual address and the offset from zero that correspond to each line of data.

The data displayed in this panel is not refreshable, and shows the data previously acquired for the panel described on page 252.
**Dump Display of Storage at Resume Address**

To display the storage at the resume address in a VTAM module where processing is to resume after the lock is acquired, use action code R (Resume address) on the Waiting for a Lock panel (Figure 116 on page 254). (The resume address displays on the last line of the Address column.)

---

<table>
<thead>
<tr>
<th>Address</th>
<th>Hex Data</th>
<th>Character Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>0047870</td>
<td>B9315820 54185620 B8D058F0 52FC4140</td>
<td>........0..</td>
</tr>
<tr>
<td>0047880</td>
<td>00150EF 982D0128 41300218 1E314150</td>
<td>...q..&amp;.. &amp;..</td>
</tr>
<tr>
<td>0047890</td>
<td>00015E50 30345050 30344130 010D1953</td>
<td>...;..&amp;..&amp;..</td>
</tr>
<tr>
<td>00478A0</td>
<td>4720BBAF 41300008 19F34780 B7934130</td>
<td>........3..1..</td>
</tr>
<tr>
<td>00478B0</td>
<td>000819F3 47B88BC1 96B01248 47F0B8C5</td>
<td>........3..Ao..O.E</td>
</tr>
<tr>
<td>00478C0</td>
<td>947F1248 58E01244 07FE0001 FFFFFFFFF</td>
<td>m&quot;..........0</td>
</tr>
<tr>
<td>00478D0</td>
<td>FFFFFFF4 FFFFFFF8 7FFFFFFF 80000000</td>
<td>...4..0&quot;.. .....</td>
</tr>
<tr>
<td>00478E0</td>
<td>000000FF 00000000 80000000</td>
<td>.............</td>
</tr>
<tr>
<td>00478F0</td>
<td>FF800000 00000000 80000000 00483CC</td>
<td>........M..</td>
</tr>
<tr>
<td>0047900</td>
<td>00046000 00000000 10000000 00000000</td>
<td>..M------------</td>
</tr>
<tr>
<td>0047910</td>
<td>40000000 40000000 40000000 40000000</td>
<td>... ... ... ...</td>
</tr>
<tr>
<td>0047920</td>
<td>00000000 00000000 18000000 38000000</td>
<td>.............</td>
</tr>
<tr>
<td>0047930</td>
<td>18000000 C9E2E3C1 C9C3909 D9D73F3</td>
<td>...ISTAICRRPL3</td>
</tr>
<tr>
<td>0047940</td>
<td>00000000 00000000 00000000 00000000</td>
<td>.............</td>
</tr>
<tr>
<td>0047950</td>
<td>00000000 00000000 00000000 00000000</td>
<td>.............</td>
</tr>
<tr>
<td>0047960</td>
<td>00000000 00000000 00000000 00000000</td>
<td>.............</td>
</tr>
<tr>
<td>0047970</td>
<td>01000000 00000000 00000000 00000000</td>
<td>.............</td>
</tr>
<tr>
<td>0047980</td>
<td>00000000 00000000 00000000 00000000</td>
<td>.............</td>
</tr>
<tr>
<td>0047990</td>
<td>00000000 00000000 00000000 00000000</td>
<td>.............</td>
</tr>
<tr>
<td>00479A0</td>
<td>03000000 00000000 00000000 00000000</td>
<td>02C0070........</td>
</tr>
<tr>
<td>00479B0</td>
<td>007800A8 00100000 08000010 000100E</td>
<td>..y.............</td>
</tr>
<tr>
<td>00479C0</td>
<td>00100000 14100000 70000000 78000000</td>
<td>............</td>
</tr>
<tr>
<td>00479D0</td>
<td>7C000000 7C000000 2C000000 07000000</td>
<td>0.........</td>
</tr>
<tr>
<td>00479E0</td>
<td>00000000 00000000 47F0FD14 0FC9E2E3</td>
<td>........0...IST</td>
</tr>
<tr>
<td>00479F0</td>
<td>C1D7C3D2 E440F9F4 48F0F1FB 90EC00C</td>
<td>APCKU 94.018..</td>
</tr>
<tr>
<td>0047A00</td>
<td>18CF8208 000820A4 000818FB 180C181D</td>
<td>........................</td>
</tr>
<tr>
<td>0047A10</td>
<td>58E02FC 58E0248 05E018FB 18F018C0</td>
<td>..................</td>
</tr>
<tr>
<td>0047A20</td>
<td>180D1820 200820B0 000820A0 00018FB</td>
<td>.J..............</td>
</tr>
<tr>
<td>0047A30</td>
<td>180C181D 58E02FC 98BDE21C 05E018BF</td>
<td>.....q..S..</td>
</tr>
</tbody>
</table>

---

Figure 121. Dump Display of Storage at Resume Address
The storage display is in dump format, which includes both hexadecimal and character representations of the data. Note the actual address that corresponds to each line of data.

You can scroll backward in order to find the module ID. The module ID (including the module name, the Julian date, and the PTF eyecatcher, if any) is displayed in the Character Data field. VTAM module names normally begin with the prefix IST.

### VTAM Constants

VTAM module ISTRACON is the *VTAM constants module*. It contains miscellaneous constants for functions that normally do not require operator modification. However, in some cases, changing one or more constants may result in improved network performance.

The remaining sections

- show how to display the VTAM constants for VTAM releases prior to 4.2
- recommend alternate values for some constants
- explain how to reset the VTAM constants

The VTAM Constants Display shows you the values that are specified in the ISTRACON module for VTAM releases prior to 4.2. Be aware that these values may have been modified via VTAMLST(ATCSTRcc) or a VTAM MODIFY command. See “Resetting VTAM Constants Specifications” on page 263.

For more detailed information about VTAM constants, see IBM's *VTAM Customization* manual.

### Obtaining Current VTAM Constants Specifications

To see the current settings for the VTAM constants, select **VTAM Constants** on the Goto pull-down. The VTAM Constants Display appears as shown in the following figure.
### VTAM Constants Display (VTAM releases prior to 4.2)

You can scroll down to see more VTAM constants by pressing F8, or you can get more information about a VTAM constant by positioning your cursor anywhere in the line for that constant and pressing F1.

**Notes:**

1. In VTAM 4.1, the operating values of constants modified by start options or the MODIFY VTAMOPTS command are not stored in the ISTRACON module. Therefore, the contents of this panel may not reflect the actual values in effect. OMEGAMON II displays a warning message.

2. In VTAM 4.2 and 4.3, constants previously defined in ISTRACON are specified exclusively through VTAM start options. Although ISTRACON is distributed, the module is not used and the constant values within it have no effect. OMEGAMON II displays a message and does not display this panel.

---

<table>
<thead>
<tr>
<th>Offset</th>
<th>Bytes</th>
<th>Name</th>
<th>Value</th>
<th>Description</th>
<th>ISTRACON - 03086F88</th>
</tr>
</thead>
<tbody>
<tr>
<td>02(02)</td>
<td>2</td>
<td>RACBSNAP</td>
<td>1000</td>
<td>Buffer requests between snapshot dumps</td>
<td></td>
</tr>
<tr>
<td>04(04)</td>
<td>2</td>
<td>RACMCPPBF</td>
<td>4096</td>
<td>Max RU size for all SSCP sessions</td>
<td></td>
</tr>
<tr>
<td>06(06)</td>
<td>2</td>
<td>RACMLUBF</td>
<td>6144</td>
<td>Max RU size for LU-LU sessions</td>
<td></td>
</tr>
<tr>
<td>08(08)</td>
<td>4</td>
<td>RACINOPT</td>
<td>X'011E'</td>
<td>Timeout value for BSC 3270's</td>
<td></td>
</tr>
<tr>
<td>12(0C)</td>
<td>10</td>
<td>Reserved</td>
<td></td>
<td>Reserved area</td>
<td></td>
</tr>
<tr>
<td>22(16)</td>
<td>2</td>
<td>RACABCNT</td>
<td>4</td>
<td>Max times a task can abend in an interval</td>
<td></td>
</tr>
<tr>
<td>24(18)</td>
<td>4</td>
<td>RACABINT</td>
<td>6866</td>
<td>Interval within which abends can occur</td>
<td></td>
</tr>
<tr>
<td>28(1C)</td>
<td>1</td>
<td>RACSSMSG</td>
<td>X'01'</td>
<td>Adjacent SSCP message control</td>
<td></td>
</tr>
<tr>
<td>29(1D)</td>
<td>1</td>
<td>RACALIAS</td>
<td>X'FF'</td>
<td>Alias name translation control flag</td>
<td></td>
</tr>
<tr>
<td>30(1E)</td>
<td>2</td>
<td>RACSSDTO</td>
<td>30</td>
<td>(VM VSE) Switched SA disconnect timeout</td>
<td></td>
</tr>
<tr>
<td>32(20)</td>
<td>4</td>
<td>RACINNBL</td>
<td>0</td>
<td>Max VS size to store IRN transmissions</td>
<td></td>
</tr>
<tr>
<td>36(24)</td>
<td>1</td>
<td>RACPDBFS</td>
<td>2</td>
<td>Max buffers for an NLDM request</td>
<td></td>
</tr>
<tr>
<td>37(25)</td>
<td>1</td>
<td>RACVCNT</td>
<td>10</td>
<td>Max SSCP rerouting count</td>
<td></td>
</tr>
<tr>
<td>38(26)</td>
<td>2</td>
<td>RACHSRT</td>
<td>1499</td>
<td>Number of entries in SRT directory</td>
<td></td>
</tr>
</tbody>
</table>

---

**Figure 122. VTAM Constants Display (VTAM releases prior to 4.2)**

**Notes:**

1. In VTAM 4.1, the operating values of constants modified by start options or the MODIFY VTAMOPTS command are not stored in the ISTRACON module. Therefore, the contents of this panel may not reflect the actual values in effect. OMEGAMON II displays a warning message.

2. In VTAM 4.2 and 4.3, constants previously defined in ISTRACON are specified exclusively through VTAM start options. Although ISTRACON is distributed, the module is not used and the constant values within it have no effect. OMEGAMON II displays a message and does not display this panel.
Resetting VTAM Constants Specifications

You probably want to leave most VTAM constants at their default settings. However, under specific circumstances you may be able to improve network performance by changing one or more of them. This section highlights some VTAM constants that you might want to change.

There are several ways to change a VTAM constant:

- You can change most of the values by zapping the ISTRACON module within the VTAMLIB library with the AMASPZAP service aid. You must then restart VTAM so that the new values take effect. For VTAM releases prior to V4.1, this is the only valid method.

- You can set all replaceable constants in the ISTRACON module with start options (in VTAMLST(ATCSTRcc)). The value in ISTRACON is the default; a value you code on a start option overrides the value in ISTRACON.

- You can reset some of the values with the MODIFY VTAMOPTS command while VTAM is running. A value you specify on the VTAMOPTS command overrides a value specified on a start option or in ISTRACON. You can use the DISPLAY VTAMOPTS command to display the current values of one or more start options.

Symbol Resolution Table Directory Sizes

The value for RACHSRT specifies the number of queue pointers in the Symbol Resolution Table (SRT) for the host network. RACONSRT specifies the number of queue pointers in each SRT directory for other networks known to the host VTAM.

If your network is large, the default value of 1499 for RACHSRT may affect multiple VTAM processes, resulting in long queues and excessive processing time. To shorten queue length and decrease search time, specify a larger directory size. Similarly, you might want to increase the default value of 43 for RACONSRT.

IBM recommends that you use prime numbers for RACHSRT and RACONSRT, to ensure an even distribution of SRT entries to the queues. These values can range from 0–X'7FF'. If you specify zero, VTAM uses the default value.
Host Node Table and Index Table Sizes

RACHNTSZ determines the size of the host node table used to find element addresses. RACCITSZ determines the size of the index tables used to find function management control blocks and conversation control blocks. The default table size is 4080.

You can reduce table search time by increasing the table size, because larger tables result in less chaining to additional blocks of entries. However, larger tables also use more storage, so your decision is a trade-off between cycles and storage.

Default EAS Value

The EAS value for VTAM determines the maximum number of SNA network addressable units and non-SNA terminals that can be active at the same time. If the total number of units and devices in the network is larger than the default of 3000, you can shorten VTAM search times by increasing the RACEAS value. RACEAS can range from 0–32767.

Because many applications do not require the 4K FMCB directory table allocated when the EAS value is 3000, you can save storage by specifying smaller EAS values in some of your APPL definitions. However, if the EAS value you specify is too small, the resulting increase in FMCB chain length will require more scan time.

To modify the EAS value for a particular VTAM application, specify the desired value in the APPL definition, not in ISTRACON. For more information on EAS values, see IBM's VTAM Customization manual.

Maximum Subarea Number

The value for RACSASUP determines the maximum subarea number supported in the network. The default of 255 is the largest allowable value. If the network contains few subareas, you can improve performance by specifying a smaller number.
Timeout Value for BSC 3270

VTAM constant RACINOPT specifies a time interval. If two general poll failures occur for a BSC 3270 during the specified interval, VTAM assumes that an unrecoverable failure has occurred, and deactivates the terminal.

If any of your users' terminals are being deactivated unnecessarily, you might want to decrease the time interval. On the other hand, if general poll failures are occurring frequently but the terminals are not deactivating, you might want to increase the time interval, so that the failures can be detected and corrected more quickly.

The value for RACINOPT is specified in units of 1.048576 seconds. The default is X'11E' (approximately 5 minutes). The value can range from 0–X'84E1FFFF'. If the value is 0, VTAM never deactivates a device as a result of a general poll failure.

Maximum Number of Input/Output Messages

RACNTWRE specifies the maximum number of IST530I/IST5321 message pairs per subarea. If the number of pending I/O operations is greater than the RACNTWRE value, VTAM writes one message pair for each type of pending I/O operation, rather than one message pair for each individual operation. To ensure that the messages report each individual operation, IBM set the default at X'7FFFFFFF'. If your network is large, specify a smaller value for RACNTWRE, to avoid flooding the network with messages.
### Chapter Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview</td>
<td>268</td>
</tr>
<tr>
<td>Requirements</td>
<td>268</td>
</tr>
<tr>
<td>Background</td>
<td>268</td>
</tr>
<tr>
<td>Benefits</td>
<td>270</td>
</tr>
<tr>
<td>TCP/IP Address Spaces</td>
<td>271</td>
</tr>
<tr>
<td>TCP/IP Buffer Pools</td>
<td>273</td>
</tr>
<tr>
<td>Connection Selection</td>
<td>274</td>
</tr>
<tr>
<td>Connections</td>
<td>275</td>
</tr>
<tr>
<td>Applications</td>
<td>277</td>
</tr>
<tr>
<td>Devices</td>
<td>278</td>
</tr>
<tr>
<td>Gateways</td>
<td>279</td>
</tr>
<tr>
<td>Configuration</td>
<td>280</td>
</tr>
<tr>
<td>TCP/IP Navigation</td>
<td>281</td>
</tr>
</tbody>
</table>
Overview

The TCP/IP component enables you to monitor and collect the performance of your mainframe TCP/IP address spaces and the network resources and applications controlled by these address spaces. Measurements include throughput, utilization, and network response time.

Requirements

Obtaining TCP/IP performance measurements requires:

- One of the following operating system environments:
  - MVS/ESA with TCP/IP version 3.2. This configuration also requires:
    - Using the TCP/IP configuration command, OBEY, to authorize the OMEGAMON II started task procedure to issue privileged commands: DROP, TRACERTE.
  - OS/390 version 2.5 with TCP/IP version 3.4 or above and C Language Environment 1.8 or above. This configuration also requires:
    - Defining an OMVS segment in RACF for the OMEGAMON II started task procedure.
    - An active SNMP agent.
    - An active SNMP subagent.
  - Enabling CSA Tracking to display TCP/IP CSA usage.
  - Answering Y to Configure the TCP/IP Component? and providing the requested parameters during CICAT configuration.

Background

Non-hierarchical non-SNA connectionless networks have proliferated. This is because of advances in communications technology and acceptance of protocol standards that have reduced implementation costs and increased telecommunications reliability and flexibility. Network interfaces have been developed to bridge the gap between non-SNA and SNA networks. By permitting distribution of network traffic over multiple and dissimilar networks, these interfaces have profoundly affected users' ability to access data regardless of computing platform or network implementation. As you migrate your networks or portions of your networks to TCP/IP, you face
new set of challenges requiring new tools. The TCP/IP component can help you meet your monitoring requirements.
Benefits

To ensure appropriate service levels and provide cost-effective solutions, it is increasingly essential that you can monitor both TCP/IP and SNA traffic from a mainframe perspective. All network traffic passing through VTAM's domain impacts VTAM utilization whether the traffic originates in the VTAM domain or in a non-SNA network domain such as TCP/IP. Conversely, traffic originating in the VTAM domain but destined for a non-SNA network impacts non-SNA (TCP/IP) network utilization.

Network planners and support staff require the ability to assess the impact of traffic from non-SNA networks on VTAM, the impact of VTAM on non-SNA network resources. This component provides part of the solution by monitoring TCP/IP address spaces, applications, and connections from a mainframe point of view.

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
TCP/IP Address Spaces

When you select TCP/IP from the Main Status panel, the TCP/IP Status Summary panel displays.

<table>
<thead>
<tr>
<th>Address Space</th>
<th>Type</th>
<th>Value</th>
<th>Pct</th>
<th>Condition</th>
<th>Type</th>
<th>Value</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>__ TCPIPA</td>
<td>CPU</td>
<td>-- 27.2%</td>
<td>Critical</td>
<td>Connections 295</td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paging</td>
<td>3.00</td>
<td>0.2%</td>
<td>Normal</td>
<td>Sockets 10</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSA</td>
<td>1025K</td>
<td>12.0%</td>
<td>Warning</td>
<td>Devices 4</td>
<td>Warning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C24</td>
<td>66K</td>
<td>2.0%</td>
<td>Warning</td>
<td>Gateways 5</td>
<td>Warning</td>
<td></td>
</tr>
<tr>
<td>__ TCPIPB</td>
<td>CPU</td>
<td>-- 27.2%</td>
<td>Critical</td>
<td>Connections 295</td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paging</td>
<td>3.00</td>
<td>0.2%</td>
<td>Normal</td>
<td>Sockets 10</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CSA</td>
<td>1025K</td>
<td>12.0%</td>
<td>Warning</td>
<td>Devices 4</td>
<td>Warning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C24</td>
<td>66K</td>
<td>2.0%</td>
<td>Warning</td>
<td>Gateways 5</td>
<td>Warning</td>
<td></td>
</tr>
</tbody>
</table>

Figure 123. TCP/IP Status Summary

This panel displays identifying information and performance measurements for your monitored TCP/IP address spaces.
On the TCP/IP Status Summary, you can use the following actions for a selected address space:

- To define which address spaces to monitor, use action codes A (Add) and D (Delete). To add an address space, you are requested to enter the TCP/IP started task name, the configuration dataset name, and the community name. You can add any address space on the current LPAR.

- To control address space monitoring, you can use action codes R (Start) and P (Stop).

- To override the default thresholds for the address space, a user with administrator authority can use action code C (Change).

- To view exceptions raised, use action code X (Exceptions).

- To view recent performance trends, use action code T (Trends).

From the TCP/IP Status Summary panel you can also reach performance and environmental information for the network resources controlled by each TCP/IP address space. To reach network resource panels, use these action codes:

- Action code BP (Buffer Pools) displays version 3.2 buffer pool utilization and status.

- Action code CO (Connections) displays status of all connected applications or those of a selected connection type.

- Action code AP (Appls) displays application status.

- Action code DE (Devices) displays network devices status.

- Action code GA (Gateways) displays gateway status.

- Action code CF (Configuration) displays the address space configuration parameters from the configuration dataset.
TCP/IP Buffer Pools

When you use action code BP (Buffer Pools) next to an address space on the TCP/IP Status Summary panel, the following panel displays if you are running TCP/IP version 3.2. Later versions of TCP/IP do not use buffer pools.

<table>
<thead>
<tr>
<th>Pool</th>
<th>Type</th>
<th>Alloc</th>
<th>Free</th>
<th>Used</th>
<th>Utilization Pct</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCB</td>
<td>356</td>
<td>119</td>
<td>237</td>
<td>66.5</td>
<td>Warning</td>
<td></td>
</tr>
<tr>
<td>ACB</td>
<td>2,000</td>
<td>1,937</td>
<td>63</td>
<td>3.1</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>ADD X LATE</td>
<td>1,500</td>
<td>1,500</td>
<td>0</td>
<td>0</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>CCB</td>
<td>250</td>
<td>128</td>
<td>122</td>
<td>48.8</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>DAT BUF</td>
<td>300</td>
<td>282</td>
<td>18</td>
<td>6.0</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>ENV</td>
<td>6,000</td>
<td>6,000</td>
<td>0</td>
<td>0</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>IP ROUTE</td>
<td>300</td>
<td>297</td>
<td>3</td>
<td>1.0</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>LRG ENV</td>
<td>50</td>
<td>49</td>
<td>1</td>
<td>2.0</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>RCB</td>
<td>50</td>
<td>49</td>
<td>1</td>
<td>2.0</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>SKCB</td>
<td>512</td>
<td>293</td>
<td>219</td>
<td>42.7</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>SM DAT BUF</td>
<td>1,200</td>
<td>1,193</td>
<td>7</td>
<td>.5</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>TCB</td>
<td>256</td>
<td>234</td>
<td>22</td>
<td>8.5</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>TINY DAT BUF</td>
<td>500</td>
<td>449</td>
<td>51</td>
<td>10.2</td>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>UCB</td>
<td>750</td>
<td>548</td>
<td>202</td>
<td>26.9</td>
<td>Normal</td>
<td></td>
</tr>
</tbody>
</table>

These action codes are available for a selected buffer pool:

- X displays the exceptions raised.
- C enables an administrator to override the default thresholds for the buffer pool.
- T displays trends for key buffer pool performance measurements.
Connection Selection

When you use action code **CO** (Connections) next to an address space on the TCP/IP Status Summary panel, the following panel displays so that you can select all, only high priority, or a specific connection type.

```
KONDI25D Connection Menu
__ Select a connection type.
Sel User ID Count Condition
1 All 35 Critical
2 High Prio 10 Warning
3 $FTP 4 Warning
4 TELNET 10 Normal
5 $SMTP 10 Normal
6 OMVS 1 Idle

F1=Help  F2=Ex_Help  F12=Cancel
```

Figure 125. TCP/IP Connection Selection

The Connection Menu is ordered by condition, critical first, and then user ID.
Connections

If you selected All from the Connections Selection menu, all connections to the selected address space are displayed, including clients and servers.

---

### Actions Goto View Options Help

---

KONDOID TCP/IP Connections: ALL

System: SYSA

More: >

Select with a "/" or an action code.

X=Exceptions S=Show details C=Change T=Trends

HI=High_Priority PI=Ping NS=Nslookup TR=Tracerte DR=Drop

---

<table>
<thead>
<tr>
<th>Application</th>
<th>Conn</th>
<th>Local Socket</th>
<th>Foreign Socket</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>__ $PORT22</td>
<td>UDP</td>
<td>PMAP</td>
<td><em>..</em></td>
<td>Normal</td>
</tr>
<tr>
<td>__ AF0G031L</td>
<td>1012</td>
<td>7651</td>
<td><em>..</em></td>
<td>Normal</td>
</tr>
<tr>
<td>__ INTCLIEN</td>
<td>1010</td>
<td>TELNET</td>
<td>10.11.74.156..1122</td>
<td>Normal</td>
</tr>
<tr>
<td>__ INTCLIEN</td>
<td>1013</td>
<td>TELNET</td>
<td>198.210.33.62..1037</td>
<td>Normal</td>
</tr>
<tr>
<td>__ INTCLIEN</td>
<td>1016</td>
<td>TELNET</td>
<td>10.2.1.204..3611</td>
<td>Normal</td>
</tr>
<tr>
<td>__ INTCLIEN</td>
<td>1019</td>
<td>TELNET</td>
<td>198.210.33.62..1040</td>
<td>Normal</td>
</tr>
<tr>
<td>__ INTCLIEN</td>
<td>1025</td>
<td>TELNET</td>
<td>198.210.33.62..1053</td>
<td>Normal</td>
</tr>
<tr>
<td>__ INTCLIEN</td>
<td>1031</td>
<td>TELNET</td>
<td>10.11.82.108..1029</td>
<td>Normal</td>
</tr>
<tr>
<td>__ QMQACHIN</td>
<td>1009</td>
<td>2001</td>
<td><em>..</em></td>
<td>Normal</td>
</tr>
<tr>
<td>__ QMQBCHIN</td>
<td>1014</td>
<td>2002</td>
<td><em>..</em></td>
<td>Normal</td>
</tr>
<tr>
<td>__ QMQCCHIN</td>
<td>1011</td>
<td>2008</td>
<td><em>..</em></td>
<td>Normal</td>
</tr>
<tr>
<td>__ S3DSH03L</td>
<td>UDP</td>
<td>1658</td>
<td><em>..</em></td>
<td>Normal</td>
</tr>
<tr>
<td>__ S3DSH03L</td>
<td>UDP</td>
<td>1656</td>
<td><em>..</em></td>
<td>Normal</td>
</tr>
<tr>
<td>__ S3DSH03L</td>
<td>UDP</td>
<td>1659</td>
<td><em>..</em></td>
<td>Normal</td>
</tr>
<tr>
<td>__ S3DSH03L</td>
<td>UDP</td>
<td>1657</td>
<td><em>..</em></td>
<td>Normal</td>
</tr>
</tbody>
</table>

---

Command ===> F1=Help F2=Keys F3=Exit F5=Refresh F6=Console **Bkwd F8=Fwd F9=Retrieve F10=Action Bar F11=Print F12=Cancel F15=Status_Display **Left F20=Right

---

Figure 126. All Connections for an Address Space
On the Connections panel, these action codes are available for a selected application:

- X (Exceptions) displays the exceptions raised.
- S (Show details) summarizes details about the connection.
- C (Change) enables a user with administrator authority to override the default thresholds for the connection.
- T (Trends) displays trends for key connection performance measurements.
- HI (High_Priority) adds the connection to the High Priority display.
- PI (Ping) builds a PING command to poll the address.
- NS (Nslookup) builds an NSLOOKUP command to return the network name associated with the address.
- TR (Tracere) builds a TRACERTE command to trace the route taken through the network by the application.
- DR (Drop) builds a DROP command to drop the connection.

Use F20 (Right) to display Interval Bytes, Idle Time, Total Bytes, and Bytes per Minute. Scroll right again to display Round Trip Time and Round Trip Variance, TELNET LU and Appl, and Status. Use F19 to scroll left.
Applications

When you use action code AP (Appls) next to a selected address space on the TCP/IP Status Summary, the applications connected to the selected address space are displayed. An application is associated with a socket which consists of a port plus a protocol. It is any TCP/IP application.

These action codes are available for a selected application:

- X displays the exceptions raised.
- C enables an administrator to override the default thresholds for the socket.
- T displays trends for key socket performance measurements.
- CO displays the connections established for the application.
When you use action code **DE** (Devices) next to an address space, the devices connected to the selected address space are displayed. Devices are channel connections.

<table>
<thead>
<tr>
<th>Device</th>
<th>Addr</th>
<th>Status</th>
<th>Device Type</th>
<th>Link Name</th>
<th>Link Type</th>
<th>Net Type</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>VMCTDO</td>
<td>CTC</td>
<td>Inactive</td>
<td>OE06</td>
<td>VMCTCL</td>
<td>CTC</td>
<td>1</td>
<td>Critical</td>
</tr>
<tr>
<td>IBM3746</td>
<td>CDLC</td>
<td>Ready</td>
<td>OB03</td>
<td>IBMTKB1</td>
<td>CDLC</td>
<td>1</td>
<td>Warning</td>
</tr>
<tr>
<td>OSATRD</td>
<td>LCS</td>
<td>Inactive</td>
<td>OA00</td>
<td>OSATRL</td>
<td>IBMTR</td>
<td>0</td>
<td>Normal</td>
</tr>
</tbody>
</table>

**Figure 128. Device Status Panel**

These action codes are available for a selected network device:

- X displays the exceptions raised.
- C enables an administrator to override the default thresholds for the device.
**Gateways**

When you use action code GA (Gateways) next to an address space, the gateways connected to the selected address space are displayed. Gateways are network routers.

---

**Figure 129. Gateway Status Panel**

These action codes are available for a selected gateway:

- **PI** builds a PING command for you to execute.
- **NS** builds an NSLOOKUP command to execute.
- **TR** builds a TRACERTE command to execute.
When you use action code **CF** (Configuration) next to an address space, the parameters from the Configuration Dataset for the selected address space are displayed.

```
KONDI0BD0 Configuration Information for: TCPIPA

; tcpip v3r2
;
; chg: 12/29/98 AE increase UCBPOOLSIZE 400--> 750
; chg: 12/29/98 AE increase ACBPOOLSIZE 1200--> 2000
; chg: 12/29/98 AE increase ENVELOPEPOOLSIZE 4000--> 5000
; chg: 09/08/98 AE increase ENVELOPEPOOLSIZE 3200--> 4000
; chg: 08/31/98 AE Added OMVS ports 5021 and 5022 for DB2
; chg: 04/06/98 AE Added OMVS ports
; chg: 03/05/98 AE increase ACBPOOLSIZE 1000--> 1200
; chg: 03/05/98 AE increase CCBPOOLSIZE 150--> 250
; chg: 03/05/98 AE increase ENVELOPEPOOLSIZE 1600--> 3200
; chg: 02/27/98 AE TCPIP V3R1 --> V3R2
;
; chg: 11/21/97 AE increase ENVELOPEPOOLSIZE 1100--> 1600
; chg: 07/25/97 AE increase SKCBPOOLSIZE 256 --> 512
; chg: 07/25/97 AE increase UCBPOOLSIZE 250 --> 400
```

Command ===>
F1=Help F2=Keys F3=Exit F6=Console **=Bkwd F8=Fwd F9=Retrieve F10=Action Bar F11=Print F12=Cancel

**Figure 130. Configuration Information Panel**

Use F8 (Fwd) to scroll to additional Configuration Dataset parameters and then use F7 (Bkwd) to return.
Chapter 13. Applications Analysis

Chapter Contents

Overview ......................................................... 284
Obtaining Application Information ...................... 284
Applications by Address Space ........................... 286
Analysis of Address Space .................................. 287
  Private Storage Usage .................................. 288
Applid Displays ................................................ 288
  Applications by Applid ................................. 289
  Applids in Address Space .............................. 290
  Analysis of Applid ...................................... 291
  LUs in Session with Applid ........................... 292
  Session Information for an LU ....................... 293
  VTAM Control Blocks for a Session ................. 293
VTAM Tables Displays ...................................... 295
  VTAM Control Blocks for Applid .................... 297
  ACB Data for Applid .................................. 298
  Control Block Usage .................................. 299
  VTAM Exits for Applid ................................. 300
  VTAM Definition Data ................................. 301
Case Study .................................................... 302
VTAM Applications Component Navigation ............. 305
Overview

A program that uses VTAM to send data to and receive data from other network resources is a VTAM application. For example, a CICS region that uses VTAM to communicate with 3270 terminals is a VTAM application. Every VTAM application identifies itself to VTAM internally through an Access Method Control Block (ACB), and accesses the network through a unique applid (a symbolic name for the application) defined to VTAM in the VTAMLST dataset.

Obtaining Application Information

VTAM assists in establishing sessions between Logical Units (LUs). Within a single LU-to-LU session, one LU is considered to be the primary (PLU) and the other secondary (SLU). PLUs are always application programs, whereas SLUs can be terminals, printers, or other applications. Each application runs within an MVS address space and can have one or more applids open. Each applid can in turn be in session with one or more LUs as shown in the following figure.

![Figure 131. Address Space, Applids, and Terminals](image-url)
Obtaining performance information on a VTAM application can be difficult and time-consuming. The Applications Analysis feature does that work for you, and displays the data in several ways. For example:

1. You can list all opened applids in the system. See “Applications by Applid” on page 289.
2. You can list all or a subgroup of the address spaces acting as VTAM applications, and then examine them.
3. You can list all or a subgroup of applids within a job.
4. Once you find the applid, you can:
   - Display analysis information, including ACB name, application subarea, REC ANY count, PLU, SLU, and APPC sessions.
   - List all the sessions and zoom in on the one you want.
   - Get control block information for the applid.
   - Display information about VTAM exits.
   - Display VTAM definition data.
   - Display control blocks and VTAM tables for a session

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
Applications by Address Space

On the main status panel, select VTAM Applications.

<table>
<thead>
<tr>
<th>A.S.Name</th>
<th>Type</th>
<th>ASID</th>
<th>Applids</th>
<th>Active</th>
<th>Pending</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONFIGRE</td>
<td>STC</td>
<td>39 (027)</td>
<td>3</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>CONFNFT</td>
<td>STC</td>
<td>40 (028)</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MAPSNUA</td>
<td>STC</td>
<td>31 (01F)</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NETTS03</td>
<td>STC</td>
<td>43 (02B)</td>
<td>24</td>
<td>40</td>
<td>0</td>
</tr>
<tr>
<td>NLTSS05</td>
<td>STC</td>
<td>197 (0C5)</td>
<td>5</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>LANTSS07</td>
<td>STC</td>
<td>106 (06A)</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>DB2TEST</td>
<td>STC</td>
<td>61 (03D)</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>TSOS15</td>
<td>TSO</td>
<td>86 (056)</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>TSOS25A</td>
<td>TSO</td>
<td>85 (055)</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Figure 132. Applications by Address Space

The Applications by Address Space panel is a useful starting point for gathering data on applications where the applids may not be known, such as CICS. It lists the following:

**A.S. Name**  
Address space name, which is the unique name by which the address space is known.

**Type**  
Whether the job is batch (BAT), a started task (STC), or a TSO user.

**ASID**  
Unique identifier for the address space assigned by MVS.

**Applids**  
Number of applids that have been opened in the address space.

**Active Sessions**  
Number of active sessions for all of the applids in the address space.

**Pending Sessions**  
Number of sessions that are queued and in the process of being activated.
The display gives an overall picture of application usage. You can get an indication of an application's activity by the number of applids and active sessions.

From this display, you can obtain:

- Detailed analysis of selected address spaces. Type A (for Analysis) next to each address space and then press Enter.
- Applids for one or more selected address spaces. Type S (for Applids) next to each address space and then press Enter.

### Analysis of Address Space

If you choose to analyze a selected address space, a panel like the one in the following figure appears.

---

<table>
<thead>
<tr>
<th>Address Space Name</th>
<th>NETTS07</th>
<th>Start date</th>
<th>03/14/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step Name</td>
<td>NETTS11</td>
<td>Start time</td>
<td>14:56:47</td>
</tr>
<tr>
<td>Job type</td>
<td>STC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>---------</td>
<td>------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Address of ASCB</td>
<td>00F35600</td>
<td>Tasks using VTAM</td>
<td>4</td>
</tr>
<tr>
<td>Address of MPST</td>
<td>00901300</td>
<td>Number of APPLs</td>
<td>7</td>
</tr>
<tr>
<td>Active sessions</td>
<td>3</td>
<td>Private storage</td>
<td>0</td>
</tr>
<tr>
<td>Pending sessions</td>
<td>0</td>
<td>Address space ID</td>
<td>106(6A)</td>
</tr>
</tbody>
</table>

Command ===>
F1=Help F2=Keys F3=Exit F5=Refresh F6=Console F9=Retrieve F10=Action Bar
F11=Print F12=Cancel F15=Status_Display

---

Figure 133. Address Space Analysis for VTAM Application Panel

The top portion of this panel shows:

- when the address space was started
- address space name
- step name, which specifies the step active in the address space
- job type: batch (BAT), started task (STC), or TSO user
The bottom portion of the panel includes control block, session, and storage information, and the number of tasks and APPLs running within the address space.

**Private Storage Usage**

The private storage usage field is particularly useful. It displays the number of bytes of data that VTAM allocated in the private area of the address space. VTAM uses this area to store messages that arrived for the application, but for which no RECEIVE was issued. If this number is too large, it means that data is arriving faster than the application can accept it.

**Applid Displays**

There are two applid panels in Applications Analysis. Both provide basic information on an applid, including:

- **State**
  - Active, inactive, pending active, pending inactive, connectable, reactivating.

- **Status**
  - Ready, holding, no logon, no SSCP, quiescing, closing, abending, init.

- **ACB name**
  - Which may be different from the applid.

- **Address space**
  - Address space name associated with the applid.

- **Sessions**
  - Number of active and pending sessions.

Depending on the type of information on hand, you want to choose from one of the two applid panels described below. One is a global list of applids; the other is a list of applids within a particular address space. From both you can navigate to displays (described in following sections) that provide detailed information on:

- analysis of a specified applid
- sessions
- control blocks
- VTAM tables
- exits
- VTAM definition data
**Applications by Applid**

Use this first display, a list of applications by applid, when you know the applid but not the address space name. Select the Goto pull-down and then select **Applications by APPLID** from the Applications by Address Space display. The following panel appears.

![Applications by APPLID Panel]

The applids are listed in alphabetical order. Locate the applid you want by paging through the panels. (You can also use the View pull-down to select a subset of applids. See “Using the View Facility” on page 45.) Enter one of the following action codes next to the applid name:

- **S** Sessions
- **A** Analysis of applid
- **C** Control blocks
- **E** Exits
- **V** VTAM definition data
- **+** All of the above

---

Chapter 13. Applications Analysis 289
Applids in Address Space

If you know the address space name, but not the applid name, you may first want to view a list of applids in an address space. To do so, enter S (Applids) next to an address space name on the Applications by Address Space display (Figure 132 on page 286). The APPLIDs in Address Space display appears.

<table>
<thead>
<tr>
<th>Actions</th>
<th>Goto</th>
<th>View</th>
<th>Options</th>
<th>Help</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

KONDAIDD APPLIDs in Address Space CLNTS07 1 to 7 of 7

Select with a "/" or an action code.
S=Sessions A=Analysis C=Control blocks E=Exits V=VTAM definition

<table>
<thead>
<tr>
<th>Applid</th>
<th>State</th>
<th>Status</th>
<th>ACBNAME</th>
<th>-----Sessions-----</th>
<th>Active</th>
<th>Pending</th>
</tr>
</thead>
<tbody>
<tr>
<td>NERT0010</td>
<td>ACTIVE</td>
<td>READY</td>
<td>CL7T0010</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>CONCAS03</td>
<td>ACTIVE</td>
<td>READY</td>
<td>CL706</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>SESS7E1</td>
<td>ACTIVE</td>
<td>READY</td>
<td>CL705</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GRE7AEW3</td>
<td>ACTIVE</td>
<td>READY</td>
<td>CL703</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GRE6AEW2</td>
<td>ACTIVE</td>
<td>READY</td>
<td>CL701</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>HEPREI1</td>
<td>ACTIVE</td>
<td>READY</td>
<td>CL700</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>VPR001</td>
<td>ACTIVE</td>
<td>NO LOGON</td>
<td>CL704</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Command ===>
F1=Help F2=Keys F3=Exit F5=Refresh F6=Console **=Bkwd **=Fwd
F9=Retrieve F10=Action Bar F11=Print F12=Cancel F15=Status_Display

Figure 135. APPLIDs in Address Space Panel

Use this panel the same way as discussed previously for the Applications by APPLID panel. That is, obtain further information by scrolling to the applid you want and entering one of the indicated action codes next to its name.
Action code **A** (Analysis) displays more detailed data on the applid and its sessions, including the number and percentage of sessions from the same versus other domains as shown in the following figure.

---

### Figure 136. Analysis of APPLID Display

Of the data shown, the **Available REC ANY count** is particularly useful in diagnosing response time problems. When an application (such as CICS) issues a receive any (REC ANY) macro, it informs VTAM that it is ready to receive data traffic for any session. VTAM queues multiple REC ANY requests. When the application issues a REC ANY, the **Available REC ANY count** is increased by 1. When one of the receives is satisfied by incoming data, that count is decremented by 1. When the number of REC ANYs reaches zero, incoming data on sessions must wait. If the value is zero, then the application program may need to be modified so that enough REC ANYs are issued and no session waits.
Enter action code **S** (Sessions) for a selected applid to get a session-level topology of the network by viewing which terminals or applications are in session with the application. This information, as shown in the following figure, can be used by network analysts and operators when debugging problems.

---

**Figure 137. LUs in Session with APPLID Panel**

On this panel you can use various action codes to display session information, control blocks, or VTAM tables for a selected LU. The actions and resulting displays are shown on the following pages.
Session Information for an LU

You can view more detail on an individual session by entering the S (Session information) action code next to the LU. This displays control block, send and receive counts, SNA, and additional session information as shown in the following figure.

---

Command ===>
F1=Help F2=Keys F3=Exit F5=Refresh F6=Console F9=Retrieve F10=Action Bar
F11=Print F12=Cancel F15=Status_Display

---

Figure 138. Session Information for APPLID Panel

VTAM Control Blocks for a Session

When you enter the I (SIB) action code next to an LU on the LUs in Session with Applid panel (see Figure 137 on page 292), the contents of the SIB are displayed. The display is in dump format, which includes both hexadecimal and character representations of the data. Notice the actual address and the offset from zero that correspond to each line of data.
The SIB indicates the status of an LU-to-LU session. Session services uses an SIB to keep track of which sessions exist and how far session establishment or termination has proceeded for a session. There is one SIB for each session request received by VTAM.

**RPL**

When you enter the L (RPL) action code on the LUs in Session with Applid panel, the contents of the RPL for the selected LU are displayed in dump format. The RPL is a work element used by applications as a parameter list to present requests to VTAM. Once the request has been processed, the RPL is used as a feedback area to inform the application of the request processing results.

Because control blocks are transient, when you request an RPL, it is possible that it cannot be found. If possible, the CRPL is shown instead, and error message pop-up KONCV142 alerts you. The CRPL contains most of the data from the original RPL.
When you enter the C (COSTAB) action code on the LUs in Session with Applid panel, the entire COS table is displayed in dump format.

The class of service table (COSTAB) comprises sequential lists of virtual routes. The virtual routes are grouped according to specific characteristics such as transmission speed. In the MODETAB macro, there is a parameter called COS which specifies the name of the class-of-service to be used for a session that uses the logon mode. If the PLU is a cross-domain resource (CDRSC), the COSTAB data is unavailable in this domain. Error message KONCV126 gives you the name of the table.

When defining a route to the COSTAB, consider the performance requirements of a session. Batch jobs could use a lower priority route, while an interactive session would require a higher priority to provide better response time.
USSTAB

If you enter the U (USSTAB) action code, the entire USSTAB is displayed in dump format. The USSTAB contains definitions of VTAM commands and messages. VTAM is shipped with two IBM-supplied USS tables. You can redefine these VTAM commands and messages to reflect your site's requirements. If the SLU is a cross-domain resource (CDRSC), the USSTAB data and the name of the USS table are unavailable in this domain. Instead of the table display, you will see a pop-up of error message KONCV126.

You can use the USSTAB operand of a logical unit's LU definition statement to associate a USSTAB with the LU. Additionally, you can use the TYPE=USSTAB operand of the VTAM MODIFY TABLE operator command to specify a USS table for one or more LUs. You can use the SSCPFM and USSTAB operands of the APPL definition statement for a program operator application to designate a specific USS table for that application. If no replacement USS tables are specified, the default IBM-supplied tables are used.

MODETAB

When you enter the M (MODETAB) action code, the LOGMODE entry in the MODETAB for the selected LU is displayed in dump format.

The MODETAB table contains sets of session parameters representing session protocols to be used in a session. For the selected LU, the display shows an individual LOGMODE entry defined by the MODEENT macro. The MODETAB macro describes the MODETAB table, which is a set of MODEENTs. If the PLU is a cross-domain resource (CDRSC), its LOGMODE entry data is unavailable in this domain. Error message KONCV144 gives you the name of the LOGMODE entry.

VTAM has an IBM-supplied mode table (MODETAB) named ISTINCLM, which provides generally accepted session protocols for a basic list of IBM device types. You can modify or replace the IBM-supplied logon mode table, provided that the modified or replacement table has the same name as the IBM-supplied table and that the IBM-supplied table is deleted. However, it is recommended that you create supplementary tables instead of deleting the IBM-supplied table, since the IBM-supplied table might be needed for problem determination.

If you request a LOGMODE entry display, it is possible that the MODETAB was found but the LOGMODE entry could not be determined at the time of the request. Possible reasons include the following:

- The MODETAB was being dynamically refreshed.
- The session was in a transitional state such as initiation or termination.
In such cases, error message pop-up KONCV143 provides the name of the MODETAB. You can retry the request.

**VTAM Control Blocks for Applid**

When you enter action code `C` (Control Blocks) next to a selected applid on the Applications by APPLID panel (see Figure 134 on page 289), the following panel appears.

![Control Blocks Panel]

This panel provides the major VTAM control block addresses for an applid. Each control block on this panel is selectable. Use action code `S` (Show Data) to display the contents of the control block.

Figure 141. VTAM Control Blocks for APPLID

This panel provides the major VTAM control block addresses for an applid.
ACB Data for Applid

If you select ACB, the contents of the ACB for the applid are displayed in dump format.

<table>
<thead>
<tr>
<th>Address</th>
<th>Offset</th>
<th>Hex Data</th>
<th>Character Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>/zerodot/zerodot/zerodot43B4/zerodot</td>
<td>/zerodot/zerodot/zerodot/zerodot</td>
<td>A/zerodot2/zerodot/zerodot/zerodot6C ... 8/zerodotD/zerodotC/zerodot/zerodot/zerodot94/zerodot/zerodot/zerodot/zerodot/zerodot1</td>
<td>...%.....}{..m...</td>
</tr>
<tr>
<td>/zerodot/zerodot/zerodot43B5/zerodot</td>
<td>/zerodot/zerodot1/zerodot</td>
<td>... /zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot</td>
<td>................</td>
</tr>
<tr>
<td>/zerodot/zerodot/zerodot43B8/zerodot</td>
<td>/zerodot/zerodot4/zerodot</td>
<td>... /zerodot/zerodot43/zerodotF4 41F/zerodot/zerodot/zerodot2/zerodot</td>
<td>...........4./zerodot..</td>
</tr>
<tr>
<td>/zerodot/zerodot/zerodot43BA/zerodot</td>
<td>/zerodot/zerodot6/zerodot</td>
<td>/zerodot/zerodot6DCE58 /zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot /zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot/zerodot</td>
<td>.2...</td>
</tr>
</tbody>
</table>

Command ===> _________________________________________________________________
F1=Help F2=Keys F3=Exit F5=Refresh F6=Console **=Bkwd **=Fwd F9=Retrieve
F10=Action Bar F11=Print F12=Cancel F15=Status_Display

Figure 142. ACB Data for Applid Panel

A similar panel is displayed for each of the control blocks that relate to an applid:

**ACB** Represents a VTAM application. It defines the interface between application code and VTAM routines so that the application can use VTAM facilities.

**ACDEB** Built when an ACB is open, the ACDEB relates to the ACB. It is the beginning of the chain of control blocks that associate an application to VTAM routines and request VTAM processing for the application. It includes information for scheduling some data transfers and also controls application and session termination.

**LUCB** Anchors control blocks for an application's active and pending sessions between ACB open and close time.

**PST** Controls asynchronous functions such as I/O, completion, and session-request completion. There is one PST per application task.
RAP Entry in the VTAM resource definition table that defines a specific application.

TCB Contains task-related information and pointers. The control program writes into and reads from the TCB.

When you request one of the above control blocks, OMEGAMON II displays the data starting at the address shown on the Control Blocks for Applid panel. Possible reasons include the following:

- The data at that address is no longer valid because the address space cannot be swapped in.
- The address space is gone.
- The session has terminated.

In such cases an error message pop-up (KONCV137—KONCV141) will explain why the control block cannot be displayed. The SIB or RPL may still be available.

**Control Block Usage**

Control blocks and VTAM tables are vital debugging tools for session-related problems. Instead of perusing an entire address space dump, the control block and table displays directly provide information you need for problem determination.

To obtain a printout of a control block or table display, press F11 (Print). Also, you can use the SNAP and VIEW commands to save the panel image for later retrieval and printing. For more information about the snapshot facility, see “Saving and Retrieving Panels” on page 61.
VTAM Exits for Applid

If you select action code E (Exits) next to a selected applid on the Applications by APPLID display (see Figure 134 on page 289), the following panel appears.

---

Command ===>
F1=Help F2=Keys F3=Exit F5=Refresh F6=Console F9=Retrieve F10=Action Bar
F11=Print F12=Cancel F15=Status_Display
---

Figure 143. VTAM Exits for APPLID

This panel provides the VTAM systems programmer with the addresses of the exits that are used for an applid and indicates which exits are not being used. An application may be unprepared for certain network conditions if the proper exits are not provided. Thus, the display can be used to expose problems with an application. For example, suppose no LOSTERM exit exists for an application. This exit is driven when VTAM terminates a session. If a session with that application is terminated, the application does not receive that information.

For further information on VTAM exits, see the IBM manual VTAM Programming.
Enter action code V (VTAM definition) next to a selected applid on the Applications by APPLID display. The following panel appears.

![Panel](image)

**Figure 144. VTAM Definition Data for APPLID**

This panel shows how the applid is defined in VTAMLST, including its:

<table>
<thead>
<tr>
<th><strong>Major node</strong></th>
<th>Where the applid is defined and where the systems programmer can make changes. It maps the applid to the member name in the VTAMLST dataset. The major node name is the same as the member name.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EAS value</strong></td>
<td>Estimated Application Sessions. The estimated number of sessions that the applid may have.</td>
</tr>
<tr>
<td><strong>Modetab</strong></td>
<td>Modetable; the table of logon mode entries.</td>
</tr>
<tr>
<td><strong>DLOGMOD</strong></td>
<td>Default logmode name.</td>
</tr>
<tr>
<td><strong>Exits in SRB mode</strong></td>
<td>Whether the exits provided by the applid are scheduled in either the SRB (Service Control Block) or TCB (Task Control Block).</td>
</tr>
<tr>
<td><strong>MAX private</strong></td>
<td>Maximum amount of storage VTAM is allowed to queue into the address space.</td>
</tr>
<tr>
<td>----------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Parallel sessions</strong></td>
<td>Whether 2 LUs can have more than one session between them.</td>
</tr>
<tr>
<td><strong>APPC capable</strong></td>
<td>Capable of carrying on LU 6.2 type sessions.</td>
</tr>
<tr>
<td><strong>Vary Logon Logmode</strong></td>
<td>If non-blank, the default logmode was overridden by a VTAM operator command. If blank, the default logmode was not overridden by a VTAM operator command.</td>
</tr>
<tr>
<td><strong>VTAM FRR coverage</strong></td>
<td>Whether Functional Recovery Routine coverage is provided by VTAM (yes) or the user (no).</td>
</tr>
<tr>
<td><strong>Authorizations</strong></td>
<td>Authorized functions that have been enabled for the applid.</td>
</tr>
</tbody>
</table>

**Case Study**

The following case study is similar to one that may occur at your facility.

Users logged onto CICS at your facility are reporting slow response times. After first investigating the situation, you determine the problem is in the host and not the network by using the OMEGAMON II response time feature (see “Response Time” on page 181). Here are the steps you might then follow to resolve such a problem using Applications Analysis:

1. Enter the A (Analysis) action code for a selected applid on the Applications by APPLID panel.
2. The first panel is Applications by Address Space. Scroll through the CICS address space names until you find the applid you want (in this example, we use the name CICSPROD.)
3. Select the address space name with the S (Sessions) action code.
4. The APPLIDs in Address Space display appears for CICSPROD as shown in the following figure.
Figure 145. Case Study: APPLIDs in Address Space

5. You want Analysis information on CICSPROD. In particular, you want to examine the **Available REC ANY count**. Enter action code A (Analysis) next to the single applid labeled DCICFAC1.

6. The Analysis of APPLID panel appears as in the following figure.
### KONDALDD Analysis of APPLID DCICFAC1

<table>
<thead>
<tr>
<th>Address space name.</th>
<th>DCICFAC1</th>
<th>Activation date</th>
<th>04/06/90</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACBNAME</td>
<td>DCICFAC1</td>
<td>Activation time</td>
<td>04:56:15</td>
</tr>
<tr>
<td>State</td>
<td>ACTIVE</td>
<td>Active sessions</td>
<td>11</td>
</tr>
<tr>
<td>Status</td>
<td>READY</td>
<td>PLU sessions</td>
<td>11</td>
</tr>
<tr>
<td>Acting as</td>
<td>PLU ONLY</td>
<td>SLU sessions</td>
<td>0</td>
</tr>
<tr>
<td>Application subarea</td>
<td>1</td>
<td>APPC sessions</td>
<td>0</td>
</tr>
<tr>
<td>Base element address</td>
<td>1493</td>
<td>Pending sessions</td>
<td>1</td>
</tr>
<tr>
<td>Number of APPLS on TCB</td>
<td>1</td>
<td>Sessions waiting</td>
<td>0</td>
</tr>
<tr>
<td>Available REC ANY count</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Same domain sessions       | 5        | 45%                | -=-=-=-=-=-=-=-=-=-=-|
| Cross domain sessions      | 6        | 55%                | -=-=-=-=-=-=-=-=-=-=-|

---

**Figure 146. Case Study: Using the Analysis of APPLID Panel**

7. The **Available REC ANY count** is presently one. However, after pressing Enter several times, you notice that the number oscillates between zero and one. When the **Available REC ANY count** is zero, incoming data to the application is queued into the private storage area rather than being processed.

8. From these facts, you deduce that you probably need to adjust CICS parameters MXT and RAPOOL to improve response times (referring to IBM CICS documentation on resource definition).
VTAM Applications Component Navigation

- **KONDMAIN**: VTAM Main Status
  - Goto: Applications
- **KONDAJAD**: Analysis of Address Space
  - A=Analysis
  - S=Sessions
  - E=Exits
  - V=VTAM Def.
- **KONDAIDD**: Applids in Address Space
  - A=Analysis
  - S=Sessions
  - L=Show Data
  - I=SIB
  - L=RPL
  - C=COSTAB
  - U=USSTAB
  - M=MODETAB
  - C=VTAM Ctl Blocks for Applid
  - E=VTAM Exits for Applid
  - V=VTAM Ctl Blocks for Applid
- **KONDAPTD**: LUs in Session with Applid
  - S=Sessions
  - C=Sessions
  - I=SIB
  - L=RPL
  - C=COSTAB
  - U=USSTAB
  - M=MODETAB

Chapter 13. Applications Analysis 305
Part III: Setting OMEGAMON II VTAM Options for Your Site

Chapter 14. Monitoring Options ........................................ 309

Chapter 15. User Authorities ............................................. 337
Chapter 14.
Monitoring Options

Chapter Contents

- Overview .................................................. 310
- Performance Objectives .................................. 310
  - Warning and Critical Numeric Thresholds ............ 310
  - Warning and Critical Status .......................... 311
  - Determining the Status Lights ........................ 311
- Monitoring Options Pull-down .......................... 311
  - Global Options ......................................... 312
  - Buffer Pool Options .................................... 314
    - Buffer Pool Monitor Options ......................... 315
    - Individual Buffer Pool Thresholds .................... 316
  - Virtual Route Options .................................. 317
    - Virtual Route Monitor Options ....................... 317
    - Virtual Route Monitor List ............................ 319
  - VTAM Environment Options .............................. 321
  - Response Time Options ................................ 322
    - Response Time Monitor Options ....................... 322
    - Response Time SMF Options ............................ 323
    - Response Time SMF Options for a Resource ............ 324
  - NCP Performance Options ............................... 325
  - Tuning Statistics Options .............................. 325
    - Tuning Statistics Monitoring Control Options ....... 326
    - Tuning Statistics Options for NCPs .................... 327
    - Tuning Statistics Options for CTCs .................... 328
    - Tuning Statistics Options for Locals .................. 329
  - Log File Utilization .................................... 330
- TCP/IP Options ........................................... 331
  - TCP/IP Default Options ................................ 331
  - TCP/IP Address Space Options ......................... 332
  - TCP/IP Buffer Pool Exceptions ......................... 333
  - TCP/IP Connection Exceptions .......................... 334
  - TCP/IP Application Exceptions .......................... 335
  - TCP/IP Device Exceptions ............................... 335
- Monitoring Options Navigation .......................... 336
Overview

The Monitoring Options pull-down includes selections for setting exception thresholds and global product defaults, logging exceptions, writing trend records to the VSAM log file and SMF, selecting VTAM and NCP resources to monitor, and other important options.

Only users with administrator authority can alter settings within the Monitoring Options selections. However, any user may view the current settings for these selections. A system administrator may grant authorization during an OMEGAMON II session via the User Authorities selection (see “User Authorities” on page 337).

OMEGAMON II provides an initial set of default values for Monitoring Options. However, since the characteristics of VTAM/NCP networks vary widely, you probably want to tailor the values to your specific network configuration.

Changes to monitoring options take effect at the next sampling interval except for changes to VTAM Environment, which take effect immediately.

For information about setting NCP resource monitoring options, see “Setting NCP Monitoring Options” in the OMEGAMON II for VTAM NCP Monitoring Guide.

Performance Objectives

OMEGAMON II enables you to set your own performance objectives by setting thresholds. A threshold is a value that indicates an unsatisfactory level of performance. A critical threshold indicates a more unsatisfactory or more severe condition than a warning threshold.

OMEGAMON II exception monitoring supports warning and critical conditions for all exceptions.

Warning and Critical Numeric Thresholds

For those exceptions where you specify numeric or percentage thresholds, you can specify both warning and critical values. We recommend setting both so that you are warned of an impending problem and also alerted when the problem needs immediate attention.
**Warning and Critical Status**

For those exceptions that monitor for the presence or absence of a specific activity, you can decide how severe the condition is (warning or critical) when it occurs at your site.

**Determining the Status Lights**

The thresholds and conditions that you specify with the Monitoring Options pop-ups determine the color of the status lights on OMEGAMON II performance displays. When OMEGAMON II detects that thresholds or conditions have been reached, status lights change from green (normal) to yellow (warning) to red (critical).

Be aware that exception recording must be active for normal, warning, and critical status lights and exception messages to display. Otherwise, the status lights are turquoise (idle).

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.

**Monitoring Options Pull-down**

Select Monitoring Options from the Options pull-down to display the menu shown in the following figure. The rest of this chapter describes selections on the Monitoring Options menu.
Global Options

Select Global Options on the Monitoring Options menu to display the panel shown below. Use this panel to set parameters that determine how OMEGAMON II collects and archives different types of data and how it accesses the VTAM console.

Recording interval

OMEGAMON II collects VTAM data and generates records for trending and historical information based on two time settings: the sampling and recording interval. The sampling interval is the number of seconds between collections of data samples. At the end of a sampling interval, OMEGAMON II writes any exception records to the Log File and/or SMF.
The recording interval is the number of minutes in which samples of VTAM data are accumulated into a single trend record. At the end of a recording interval, OMEGAMON II writes trend records to the Log File and/or SMF.

As an example, with a sampling interval of 30 seconds and a recording interval of 30 minutes, 60 samples would be collected in each trend record.

**Trend display**
How many hours to go back into the VSAM Log File when displaying trend records. You enable (or disable) trend recording for individual OMEGAMON II components (such as buffer pools, virtual routes, CTC tuning statistics) using monitoring options panels shown later in this chapter.

**Exception display**
How many hours to go back into the VSAM Log File when displaying exception records. You enable (or disable) exception recording for individual OMEGAMON II components (such as buffer pools, virtual routes, CTC tuning statistics) using monitoring options panels shown later in this chapter.

**SMF record number**
Unique, identifying number that is part of the SMF header for all OMEGAMON II records. For OMEGAMON II historical reporting to function, this number must be different from the SMF record number for any other SMF record type generated by your data center.

**VTAM trace PIU maximum**
Maximum number of PIUs to save for a single VTAM trace. The default value is 100 and the maximum is 500.

**OMEGAMON console APPLID prefix**
You can use the console facility of OMEGAMON II to issue VTAM commands via VTAM's Secondary Program Operator (SPO) facility. To use the console facility, a VTAM applid must be defined and available. As an administrator, you provide the applids by specifying their common 5-character prefix. Use the same prefix that was specified for terminal pool prefix during OMEGAMON II CICAT configuration.

OMEGAMON II appends a c followed by a 2-digit sequence number (beginning with C01) to this prefix to create a pool of applids. The list of applids is searched sequentially, when OMEGAMON II is started, and the first available applid is opened. For further detail, please refer to the *OMEGAMON II for VTAM Configuration and Customization Guide*.
Buffer Pool Options

Select **Buffer Pool Options** on the Monitoring Options menu to display the menu panel shown below. Choose **Monitoring Options** from this menu to display a panel for modifying defaults and common thresholds for all buffer pools. Use the remaining menu options to enable or disable exceptions and set threshold values for individual buffer pools.

```
KONDOMBP Buffer Pool Options

Select a choice by number, by mnemonic, or with the cursor.

_ 1. Monitoring options (M)...
  2. I000 Input/Output thresholds (I)...
  3. LP00 Large pageable thresholds (L)...
  4. WP00 Message control thresholds (W)...
  5. CRPL Copied RPL thresholds (C)...
  6. SP00 Small pageable thresholds (S)...
  7. LF00 Large fixed thresholds (F)...
  8. SF00 Small fixed thresholds (T)...
  9. AP00 Below 16meg line thresholds (A)...

F1=Help   F12=Cancel
```

**Figure 149. Buffer Pool Options Panel**
Use the **Buffer Pool Monitor Options** panel to set parameters that control data collection and exception monitoring for all buffer pools.

<table>
<thead>
<tr>
<th>KONDOMBM</th>
<th>Buffer Pool Monitor Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sampling interval</strong></td>
<td>30 (20-300 seconds)</td>
</tr>
<tr>
<td><strong>Exception recording</strong></td>
<td>L + (N-None/L-Log/S-SMF/B-Both)</td>
</tr>
<tr>
<td><strong>Trend recording</strong></td>
<td>L + (N-None/L-Log/S-SMF/B-Both)</td>
</tr>
<tr>
<td><strong>Default Exceptions</strong></td>
<td>Y/N</td>
</tr>
<tr>
<td>Storage request queued</td>
<td>Yes + C + (W-Warning/C-Critical)</td>
</tr>
<tr>
<td>Pool in slowdown</td>
<td>Yes + C + (W-Warning/C-Critical)</td>
</tr>
<tr>
<td>Pool expansions</td>
<td>Yes + W + (W-Warning/C-Critical)</td>
</tr>
</tbody>
</table>

**Note:** For buffer pool status lights to display normal, warning, and critical conditions, you must activate exception recording to the Log File. Otherwise, the status displays as Idle.

In the bottom part of the panel, you can enable or disable exceptions and specify their thresholds or severity for each of the VTAM buffer pools, as shown in the following figures.
**Individual Buffer Pool Thresholds**

All buffer pools use the same set of exceptions as the IO00 pool shown below.

![Buffer Pool Thresholds](image)

Figure 151. Buffer Pool Thresholds (except CRPL) Pop-up

In addition, the CRPL pool has an exception for pool usage by a single user, which is Buffer Allocation Percentage.

![Buffer Pool Thresholds](image)

Figure 152. Buffer Pool Thresholds for CRPL Pop-up
Virtual Route Options

Select **Virtual Route Monitor Options** on the Monitoring Options menu to choose which portions of your network you want to analyze and display. Virtual Route (VR) administration is divided into two parts:

**Monitor Options**
Sets global defaults for Monitor controls and exceptions for monitoring all VRs. Includes changing the sampling interval, recording exceptions and trend data, and selecting the range of monitored VRs you want to display.

**Monitor List**
Defines the list of VRs you want to monitor when Monitor Scope is L. You can select and set exception thresholds for subareas or specific VRs within subareas that you want to monitor.

When Monitor Scope is A, you use the list to specify settings for subareas that will override the global virtual route settings.

When you select **Virtual Route Options** from the Monitoring Options menu, a pop-up asks you to select either of the above virtual route monitoring choices.

**Virtual Route Monitor Options**

If you select **Monitor Options** the following panel appears.

<table>
<thead>
<tr>
<th>KOND0MVM</th>
<th>Virtual Route Monitor Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling interval</td>
<td>30</td>
</tr>
<tr>
<td>Monitor scope</td>
<td>A + (N-None/L-Monitor List/A-All)</td>
</tr>
<tr>
<td>Exception recording</td>
<td>L + (N-None/L-Log/S-SMF/B-Both)</td>
</tr>
<tr>
<td>Trend recording</td>
<td>L + (N-None/L-Log/S-SMF/B-Both)</td>
</tr>
<tr>
<td>Default Exceptions</td>
<td>Y/N Warning Critical</td>
</tr>
<tr>
<td>Flow rate (PIU/Sec)</td>
<td>Yes + 10 20</td>
</tr>
<tr>
<td>Number of sessions</td>
<td>Yes + 10 25</td>
</tr>
<tr>
<td>Virtual route blocked</td>
<td>Yes + C + (W-Warning/C-Critical)</td>
</tr>
<tr>
<td>Window size at minimum</td>
<td>Yes + W + (W-Warning/C-Critical)</td>
</tr>
</tbody>
</table>

F1=Help  F4=Prompt  F12=Cancel

Figure 153. Virtual Route Monitor Options Pop-up
The top group of selections on this panel contains the following fields:

**Sampling interval**
Number of seconds between collections of VR data samples. At the end of the sampling interval, exception records are written to the Log File and/or SMF.

For VTAM releases prior to 4.3, sampling interval should *not* exceed 30 seconds in order to insure significant data for PIUs/second.

**Monitor scope**
Range of monitored VRs you want displayed.

- **N**  Do not display or monitor any VRs.
- **L**  Use the monitor list to define thresholds, and enable and start monitoring only for specific subareas/virtual routes. To define the list, select Monitor List on the Virtual Route Monitoring Options menu.
- **A**  Display all monitored VRs using the exception and threshold settings defined on this panel. You can also use the Monitor List panel to override the global virtual route settings for individual subareas.

  **Note:** When you set Monitor Scope to A (All) and trend recording to L (Log), monitoring of all VRs begins.

**Exception and trend recording**
Enable the recording of exception and trend data for VRs:

- **N**  None. Do not write VR exception/trend records to the VSAM Log File or SMF.
- **L**  Log. Turn on recording of VR exceptions/trends to the VSAM Log File for display.
- **S**  SMF. Turn on the recording of VR exceptions/trends to SMF for longterm historical analysis.
- **B**  Both. Enable both the L (log) and S (SMF) options for VR data.
**Note:** To monitor all or selected virtual routes/subareas, you must set Trend Recording to **L** (Log).

To display normal, warning, and critical conditions in the Virtual Route status lights, you must set Exception Recording to **L** (Log), otherwise status displays as Idle.

Use the bottom group of selections on the Virtual Route Monitor Options panel to specify exceptions, threshold values, and status light settings to be used when you set Monitor Scope to **A** (All). You can override these global settings for individual subareas by using the Monitor List.

When you enable the exceptions, you also must specify warning and critical threshold values or indicate the severity — OMEGAMON II generates a warning (yellow) or critical (red) condition when the exception is detected.

### Virtual Route Monitor List

If you set Monitor Scope to **L** (Monitor List) on the Virtual Route Monitoring Options panel (see Figure 153 on page 317), you should then select **Monitor List** on the Virtual Route Monitoring Options menu to set exceptions and thresholds for specific VRs and subareas to be monitored.

You can also use this list when Monitor Scope is set to **A** (All) to override global options for individual subareas. All other subareas will use the global virtual route settings, and the subareas in the list will use the settings you specify in the list.

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Destination</th>
<th>Status</th>
<th>Monitor</th>
<th>Thresholds</th>
</tr>
</thead>
<tbody>
<tr>
<td>_1</td>
<td>CCCDRM1</td>
<td>ACTIVE</td>
<td>YES</td>
<td>VR</td>
</tr>
<tr>
<td>_2</td>
<td>CCCDRM2</td>
<td>ACTIVE</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>_4</td>
<td>CCCDRM4</td>
<td>INACT</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>_6</td>
<td></td>
<td>INACT</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>_7</td>
<td></td>
<td>ACTIVE</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>_8</td>
<td></td>
<td>ACTIVE</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>_9</td>
<td></td>
<td>ACTIVE</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>_10</td>
<td>NCP10</td>
<td>ACTIVE</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>_11</td>
<td></td>
<td>INACT</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>_12</td>
<td>CCCDRM12</td>
<td>ACTIVE</td>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>

**F1=Help  F2=Show Subareas  F3=Show Virtual Routes  F4=Monitored Subareas  **=Bkwd  **=Fwd  **=Cancel  **=Find

Figure 154. VR Monitor List Panel
This panel contains action codes for selecting the VRs and subareas you want to monitor:

**R**  Start monitoring. Specify exceptions and thresholds for a subarea or VR.

**P**  Stop monitoring.

**C**  Change threshold settings for a subarea or VR. When you enter this action code, you specify your threshold settings on the panel that appears.

**Q**  Quickstart. Start monitoring using predefined thresholds.

**L**  List all the VRs for the selected subarea.

**U**  Unlist, or remove from the display, the listed VRs for a selected subarea.

You can use the following function keys, which are unique to this function, to manipulate the VR Monitor List display:

**F2**  Displays all subareas in your network.

**F3**  Displays all VRs within each of the subareas and is the most comprehensive display.

**F4**  Shows only those subareas that are being monitored.

The following figure shows an example of a display of all VRs.
VTAM Environment Options

To set exceptions for VTAM environment problems, select VTAM Environment Options on the Monitoring Options menu. The panel shown in the following figure appears.

```
KONDOMED VTAM Environment Options

<table>
<thead>
<tr>
<th>Exceptions</th>
<th>Y/N</th>
<th>Warning</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU usage .</td>
<td>Yes</td>
<td>+ 2</td>
<td>20</td>
</tr>
<tr>
<td>PAGING rate .</td>
<td>Yes</td>
<td>+ 10</td>
<td>20</td>
</tr>
<tr>
<td>S10 rate .</td>
<td>Yes</td>
<td>+ 50</td>
<td>90</td>
</tr>
<tr>
<td>CSA allocated .</td>
<td>Yes</td>
<td>+ 25</td>
<td>50</td>
</tr>
<tr>
<td>C24 allocated .</td>
<td>Yes</td>
<td>+ 20</td>
<td>30</td>
</tr>
</tbody>
</table>
```

Figure 156. VTAM Environment Thresholds Panel

You can enable or disable any or all of the five exceptions shown and specify their warning and critical threshold values. See the associated field-level help panels or “VTAM Environment” on page 229 for the meaning of these five exceptions and how they reflect system performance.
Response Time Options

The Response Time Options selection on the Monitoring Options menu displays a menu with two selections:

1. **Monitor Options** to set global parameters for background response time monitoring.

2. **Response Time SMF Options** to create and maintain a list of terminals and applications for background collection of response time data.

OMEGAMON II writes response time data to SMF. The data is then processed by SAS or SAS/GRAPH to create color graphs, nongraphic plots, and service-level reports. (See the OMEGAMON II for VTAM Historical Reporting Guide.)


**Response Time Monitor Options**

If you select **Monitor Options** on the Response Time Options menu, the following panel displays:

```
KONDOMRM Response Time Monitor Options

Trend recording . . . . . . . S + (N-None/S-SMF)
Response time DR frequency . . 1_  (1-99)

F1=Help  F4=Prompt  F12=Cancel
```

Figure 157. Response Time Monitor Options

In the trend recording field, you enter S to record response time trend data on SMF or N to suppress recording.

In the Response Time DR Frequency field, you enter the frequency at which you want OMEGAMON II to substitute definite response (DR) processing for terminal groups. DR is performed outside of the application and therefore does not affect application performance because the application is unaware of the DR. The lower the DR frequency, the greater the precision in the response time calculation.
Response Time SMF Options

When you select **Response Time SMF Options** on the Response Time Options menu, the panel shown in the following figure appears. This panel displays how response time data is collected for each resource or resource group.

![Response Time SMF Options Panel](image)

**Figure 158. Response Time SMF Options**

**Resource** Resource or group name. The asterisk (*) wildcard in the last position of a name denotes a group (generic) definition.

**Type** Resource type. Can be one of the following:

- **T** Terminal group
- **A** Application group
- **N** NCP group
- **L** SDLC line group
- **P** SDLC physical unit group

T is the default.

**DR** Whether forced definite response (DR) is allowed for this resource; this is important when you are monitoring end-to-end response time.

**Start** Sampling start time in hours (0–23) and minutes (0–59). Zeros for both start and stop times indicate that collection is continuous. This field applies to background SMF recording; it does not affect foreground sampling.

**Stop** Sampling stop time in hours (0–23) and minutes (0–59). This field applies to background SMF recording; it does not affect foreground sampling.
**Status** Whether the resource is active, inactive, or pending. Groups already defined in the SMF Response Time Profile at the time OMEGAMON II is started are **ACTIVE**. If a new group is started, it will show a **PENDING** status. When the next recording interval begins, the status of that group changes to **ACTIVE**. If you change the interval, the new duration does not take effect until the current interval is complete.

**INACTIVE** appears when any of the following are true:

- End-to-End is unavailable.
- Recording is outside the data collection period.
- NCP resource is not found.

### Response Time SMF Options for a Resource

From the **Response Time SMF Options** panel, you can enter action codes to add (A), change (C), or delete (D) resources, or simply view (V) the resource collection settings. These actions all invoke a similar pop-up panel.

The following figure shows the Add SMF Definition pop-up.

![Add SMF Definition Pop-up](image)

**Figure 159. SMF Response Time Pop-up for Adding a Resource**

In the top part of this panel you enter the information that displays on the Response Time SMF Options panel (see Figure 158 on page 323).
In the bottom part, you enter response time ranges. You can enter upper bound values for up to four ranges for both host and network components of a transaction. If you create service-level reports, you can view the total number of transactions and the percent of the transactions falling within each of the four response time ranges.

Once you have added an SMF definition, you can view its values using the V or C action code. However, you must change a resource definition with the C action code.

### NCP Performance Options

For details about using the NCP Performance Options selection on the Monitoring Options menu, see “Setting NCP Monitoring Options” in the *OMEGAMON II for VTAM NCP Monitoring Guide*.

### Tuning Statistics Options

There are three TNSTATs selections on the Monitoring Options menu for NCP, CTC, and Local tuning statistics. In these Monitoring Options panels, you set parameters that control collection and exception monitoring. Each panel consists of a monitoring control portion followed by an exceptions portion. The monitoring control portion is the same for all TNSTATs Monitoring Options panels. The exception settings portion is different for NCPs, CTCs, and Locals.
**Tuning Statistics Monitoring Control Options**

The three monitoring control fields and their choices are:

**Sampling interval**
Number of seconds between collection of TNSTATs data samples. Exception records are written to the Log File and/or SMF at the end of a sampling interval.

**Exception and trend recording**
Four choices are available:

- **N** None. Do not record TNSTATs exceptions/trends on the Log file or SMF.
- **L** Log. Turn on the recording of TNSTATs exceptions/trends to the VSAM Log File for display. The amount of data you can retain in the Log File is limited by the size of the file.
- **S** SMF. Turn on the recording of TNSTATs exceptions/trends to SMF for longterm historical analysis.
- **B** Both. Enable both the L (log) and S (SMF) options for TNSTATs data.

*Note:* For TNSTATs status lights to display normal, warning, and critical conditions, you must activate exception recording to the Log File. Otherwise, status displays as Idle.
Tuning Statistics Options for NCPs

See “Tuning Statistics Monitoring Control Options” on page 326 for an explanation of the monitoring control options in the upper portion of the panel: Sampling Interval, Exception Recording, and Trend Recording.

Use the exceptions portion of the TNSTATS NCP Options panel as shown below, to activate and change thresholds for channel-attached NCP exceptions.

<table>
<thead>
<tr>
<th>Exception</th>
<th>Y/N</th>
<th>Warning</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Queued PIUs outbound</td>
<td>Yes</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>PIUs per channel read</td>
<td>Yes</td>
<td>7</td>
<td>5 (Tenths)</td>
</tr>
<tr>
<td>PIUs per channel write</td>
<td>Yes</td>
<td>7</td>
<td>5 (Tenths)</td>
</tr>
<tr>
<td>ATTN per channel read</td>
<td>Yes</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Slowdown</td>
<td>Yes</td>
<td>C</td>
<td>(W-Warning/C-Critical)</td>
</tr>
</tbody>
</table>

Figure 160. TNSTATS NCP Options Pop-up

The PIUs per Channel Read and PIUs per Channel Write fields display the values in tenths. Thus, a value of 20 in either of those fields means 20 tenths, or 2.0. See “NCP Tuning Statistics” on page 165 for details on using NCP TNSTATs.
**Tuning Statistics Options for CTCs**

See “Tuning Statistics Monitoring Control Options” on page 326 for an explanation of the monitoring control options in the upper portion of the panel: Sampling Interval, Exception Recording, and Trend Recording.

Use the exceptions portion of the TNSTATS CTC Options panel to enable or disable the CTC tuning statistics exceptions, specify warning and critical threshold values, indicate the severity of a slowdown condition, and set exception threshold values for MPC CTCs.

<table>
<thead>
<tr>
<th>KONDOMCD</th>
<th>TNSTATS CTC Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling interval . . . . . . .</td>
<td>30</td>
</tr>
<tr>
<td>Exception recording . . . . . .</td>
<td>B +</td>
</tr>
<tr>
<td>Trend recording . . . . . . .</td>
<td>B +</td>
</tr>
<tr>
<td>Exceptions</td>
<td>Y/N</td>
</tr>
<tr>
<td>Percent of priority PIUs (CTCA)</td>
<td>Yes +</td>
</tr>
<tr>
<td>Queued PIUs outbound . . (CTCA)</td>
<td>Yes +</td>
</tr>
<tr>
<td>PIUs per channel write . (CTCA)</td>
<td>Yes +</td>
</tr>
<tr>
<td>Buffer utilization percent (MPC)</td>
<td>Yes +</td>
</tr>
<tr>
<td>Outbound PIUs per SIO . . (MPC)</td>
<td>Yes +</td>
</tr>
<tr>
<td>QSWEEPS . . . . . . . . . (MPC)</td>
<td>Yes +</td>
</tr>
<tr>
<td>TSWEEPs . . . . . . . . (MPC)</td>
<td>Yes +</td>
</tr>
<tr>
<td>Slowdown . . . . . . . (Both)</td>
<td>Yes +</td>
</tr>
</tbody>
</table>

Figure 161. TNSTATs CTC Options

The **PIUs per Channel Write** field displays the values in tenths. Therefore, a value of 20 in this field means 20 tenths, or 2.0. See “CTC Tuning Statistics” on page 145 for details on using CTC TNSTATs.
Tuning Statistics Options for Locals

See “Tuning Statistics Monitoring Control Options” on page 326 for an explanation of the monitoring control options in the upper portion of the panel: Sampling Interval, Exception Recording, and Trend Recording.

Use the Exceptions field on the panel shown below to enable or disable the Slowdown exception and specify the severity (warning or critical) of a slowdown condition. See “Local Tuning Statistics” on page 174 for details on using Local TNSTATs.

<table>
<thead>
<tr>
<th>KONDOMLD</th>
<th>TNSTATS LOCAL Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sampling interval</td>
<td>30_ (20-300 seconds)</td>
</tr>
<tr>
<td>Exception recording</td>
<td>L_+ (N-None/L-Log/S-SMF/B-Both)</td>
</tr>
<tr>
<td>Trend recording</td>
<td>L_+ (N-None/L-Log/S-SMF/B-Both)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Exceptions</th>
<th>Y/N</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slowdown....</td>
<td>Yes +</td>
<td>C + (W-Warning/C-Critical)</td>
</tr>
</tbody>
</table>

F1=Help F4=Prompt F12=Cancel

Figure 162. TNSTATS LOCAL Options Pop-up
Log File Utilization

Log File Utilization is the last selection on the Monitoring Options menu. OMEGAMON II writes its trend and exception records to two VSAM Log Files, a primary and an alternate, that are defined when OMEGAMON II is configured (see the OMEGAMON II for VTAM Configuration and Customization Guide). The two Log Files operate in a wraparound fashion. When all space is used in the primary file, OMEGAMON II writes data to the alternate file. After the alternate file is filled, the process begins anew, with current data overwriting old data in the primary file.

The Log File Utilization panel shows the DASD used by trend and exception recording for each OMEGAMON II component.

![Log File Utilization Panel]

Figure 163. Log File Utilization Panel

For each component, this panel displays the number of records generated, the space in kilobytes occupied by those records, and the percentage of VSAM space used. Exception records are typically generated at much shorter intervals than trending records. Therefore, you typically see a greater number of exception records than trending records.

The Space value appears highlighted for each OMEGAMON II component that is currently writing exception or trend records.
TCP/IP Options

Use the TCP/IP Options on the Monitoring Options menu to specify the TCP/IP defaults for:

- address spaces monitoring options and thresholds
- buffer pool exceptions
- connection exceptions
- application exceptions
- device exceptions

TCP/IP Default Options

When you select TCP/IP Options from the Monitoring Options menu, the following menu displays:

KONDOI0D TCP/IP Default Options
Select a choice by number, by mnemonic, or with the cursor.

1. TCP/IP Address Space Options (T)...
2. Buffer Pool Exceptions (B)...
3. Connection Exceptions (C)...
4. Application Exceptions (A)...
5. Device Exceptions (D)...

F1=Help  F12=Cancel

Figure 164. TCP/IP Default Monitoring Options Menu

Select the type of options for which you want to specify defaults.
When you select **TCP/IP Address Space Options** from the TCP/IP Default Options menu, the following panel displays.

![TCP/IP Address Space Monitoring Options](image)

**Figure 165. TCP/IP Address Space Monitoring Options**

Use this panel to specify defaults for monitoring TCP/IP address spaces. You can override these values for selected address spaces on the TCP/IP Status Summary panel (see Figure 123 on page 271).
When you select **Buffer Pool Exceptions** from the TCP/IP Default Options menu, the following panel displays.

```
KONDOI2D TCP/IP 3.2 Buffer Pool Exceptions

Exception Thresholds Y/N Warning Critical
----------------------------------- --- --- ---
ACB........ Yes + 60_ % 85_ %
CCB........ Yes + 60_ % 85_ %
Dat buf..... Yes + 60_ % 85_ %
Sm dat buf.. Yes + 60_ % 85_ %
Tiny dat buf.. Yes + 60_ % 85_ %
Env......... Yes + 60_ % 85_ %
Lrg env..... Yes + 60_ % 85_ %
RCB......... Yes + 60_ % 85_ %
SCB......... Yes + 60_ % 85_ %
SKCB........ Yes + 60_ % 85_ %
TCB......... Yes + 60_ % 85_ %
UCB......... Yes + 60_ % 85_ %
Add Xlate.... Yes + 60_ % 85_ %
IP route..... Yes + 60_ % 85_ %

F1=Help  F4=Prompt  F12=Cancel
```

**Figure 166. TCP/IP 3.2 Buffer Pool Exceptions**

Use this panel to specify defaults for monitoring TCP/IP version 3.2 buffer pools. You can override these values for selected pool types on the TCP/IP Buffer Pools panel (see Figure 124 on page 273).
When you select **Connection Exceptions** from the TCP/IP Default Options panel, the following panel displays.

![Figure 167. TCP/IP Connection Exceptions](image)

Use this panel to specify defaults for monitoring TCP/IP connections. You can override these values for selected applications on the TCP/IP Connections panels for the various connection types (for example, see Figure 126 on page 275).
TCP/IP Application Exceptions

When you select Application Exceptions from the TCP/IP Default Options menu, the following panel displays.

<table>
<thead>
<tr>
<th>Exceptions</th>
<th>Y/N</th>
<th>Warning</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Throughput in Kbytes/min</td>
<td>No</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Connection count</td>
<td>No</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>

F1=Help  F4=Prompt  F12=Cancel

Figure 168. TCP/IP Application Exceptions

Use this panel to specify the defaults for monitoring TCP/IP applications. You can override these values for selected applications on the TCP/IP Application Status panel (see Figure 127 on page 277).

TCP/IP Device Exceptions

When you select Device Exceptions from the TCP/IP Default Options panel, the following panel displays.

<table>
<thead>
<tr>
<th>Exceptions</th>
<th>Y/N</th>
<th>Warning</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Ready...</td>
<td>Yes</td>
<td>+</td>
<td>(W-Warning, C-Critical)</td>
</tr>
</tbody>
</table>

F1=Help  F4=Prompt  F12=Cancel

Figure 169. TCP/IP Device Exceptions

Use this panel to specify defaults for monitoring TCP/IP devices. You can override these values for selected devices on the TCP/IP Device Status panel (see Figure 128 on page 278).
Monitoring Options Navigation

See the NCP Monitoring Guide

- KONDOTOD: Terminal Options
- KONDODGOD: Global Options
- KONDOMB: Buffer Pool Monitoring Options
- KONDOKOARD: Autorefresh Options
- KONDOMBV: Individual Buffer Pool Thresholds
- KONDOSBD: Status Bar Options
- KONDOR: Buffer Pool Options Menu
- KONDOMVR: VR Options Menu
- KONDOMVD: VR Monitor List
- KONDOSBD: Network Manager Options
- KONDOMRT: Resp Time Options Menu
- KONDOMRM: Resp Time Monitor Options
- KONDOSPBD: Historical Graph Options
- KONDOMNS: NCP Performance Options
- KONDOMRD: Resp Time SMF Options
- KONDOPBD: Printer Options
- KONDOMHD: NCP Options
- KONDOMOD: NCP Default Options
- KONCV990: n screens routed for printing
- KONDOMID: TNSTATs NCP Options
- KONDOMLD: NCP Site Monitor List
- KONDOPUD: Log File Utilization
- KONDOMID: TNSTATs Local Options
- KONDODMLD: TCP/IP Addr Space Options
- KONDODUD: Device Exceptions
- KONDODID: TCP/IP Options
- KONDODMLC: Connection Exceptions
- KONDODI2D: Buffer Pool Exceptions
- KONDODI3D: Application Exceptions
Overview

This chapter describes the User Authorities choice on the Options pull-down. Use User Authorities to set and change authorization levels for user access to different features of the product. This chapter discusses the levels of access recognized by User Authorities and describes how to add, modify, and delete user authorizations.

See the information about setting security in the OMEGAMON II for VTAM Configuration and Customization Guide for instructions on

- implementing an external security package to authorize logons
- maintaining the user IDs that users require to log onto OMEGAMON II
- implementing the external security package to authorize users to functions, as an alternative to using User Authorities

Access Levels

You must have administrator authority to modify the settings in the User Authorities path. However, any user may view the current settings. An administrator selects User Authorities to add, delete, or change user access levels.

The administrator determines the access levels of all other users, and may even designate other administrators. Users may be granted access to the following areas:

- system administration
- the response time feature
- the VTAM trace feature
- the VTAM console

Thus, there may be several classes of users with different types of product access. All user authority changes made by administrators are saved permanently.

An administrator is allowed to access all OMEGAMON II features, including viewing and changing of monitoring options as well as user authorities.

Users without administrator authority are allowed to view all monitoring options but are not allowed to change any of them. When a user without authority to either access a feature or change monitoring options attempts to do so, the message AUTHORIZATION REQUIRED displays. If you receive this message and you need to use the facility that generated the message, contact your system administrator.
After OMEGAMON II is installed, the first person to log on causes two entries to be automatically created on the User Authorities display panel, as shown in Figure 170 on page 340.

1. A user ID of $DEFAULT with all authority flags set to NO.
2. The first user's logon ID with all authority flags set to YES.

This establishes the first OMEGAMON II user as an administrator. The administrator can then tailor the $DEFAULT authorities for the installation and add new user IDs if necessary.

**Note:** You may change the $DEFAULT user ID, but you may not delete it. The authority flags defined for the $DEFAULT user ID apply to all users who log onto OMEGAMON II without being defined in the User Authorities Table.

### OMEGAVIEW Considerations

If you use OMEGAVIEW, you want to ensure that the response time options (profile) for the OMEGAVIEW collector session and zoomed to OMEGAMON II sessions are synchronized. As a product administrator, do the following:

1. Add the OMEGAVIEW collector session user ID, authorizing the user ID to access the OMEGAMON II Response Time feature.
2. Sign onto OMEGAMON II with the collector session user ID.
3. In the OMEGAMON II Response Time component, set the Response Time options required for using OMEGAVIEW. Make sure to specify **Start at Logon**.

**Result:** The response time profile for any OMEGAVIEW user who zooms to an OMEGAMON II session is automatically synchronized with the response time profile that you defined for the collection session user ID.

When you are using OMEGAMON II, you can press F1 if you need help. Helps include comprehensive field descriptions and detailed technical information. If your cursor is on an input or display field when you press F1, you get help for that field; otherwise, you get help for the panel.
User Authorities Options

To access User Authorities, select **Options** from any panel's action bar and then select **User Authorities**. This displays the User Authorities panel, which describes all user authorizations that have been defined.

Any user ID that is not listed assumes the default authorizations specified for $DEFAULT.

<table>
<thead>
<tr>
<th>Userid</th>
<th>Name</th>
<th>Dept</th>
<th>ADM</th>
<th>CON</th>
<th>RT</th>
<th>TRC</th>
</tr>
</thead>
<tbody>
<tr>
<td>$DEFAULT</td>
<td>Default Authorities</td>
<td>Network</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>DCSP35</td>
<td>Betsy Ross</td>
<td>R&amp;D</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>OMVIEW</td>
<td>OMVIEW</td>
<td>OMVIEW</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CSTS92</td>
<td>Tom Jefferson</td>
<td>Network</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CSDL31</td>
<td>Martin King</td>
<td>R&amp;D</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CSDF02</td>
<td>John Paul Jones</td>
<td>Network</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CSDF10</td>
<td>John Smith</td>
<td>Network</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CSDF14</td>
<td>John Kennedy</td>
<td>Network</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CSDF01</td>
<td>John Adams</td>
<td>Network</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CSDF10</td>
<td>Ben Franklin</td>
<td>Network</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>CSDF12</td>
<td>Abe Lincoln</td>
<td>Network</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>CSDF08</td>
<td>Susan Anthony</td>
<td>Network</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Figure 170. Users Authorities Display Panel**

This panel shows 4 columns which indicate the access authority each user has to the following OMEGAMON II facilities:

**ADM** Whether or not the user is an administrator. When ADM is Yes, all authorities for that user are Yes.

**CON** Whether or not the user is allowed to access the VTAM console.

**RT** Whether or not the user is allowed to access the Response Time feature.

**TRC** Whether or not the user is allowed to access the VTAM Trace feature.
Add User Authorities

To add a new user authorization to the User Authorities table, enter action code A (Add) next to any user ID on the User Authorities panel. The Add User Authorities panel displays.

```
+---------------------------------------------------------+
| KONDOUAA Add User Authorities                          |
|                                                          |
| Type the requested information, then press Enter.       |
|                                                          |
| User Identification                                    |
|   User ID. . . . . . . . . . . . . . . . . . . . . . . . |
|   Department . . . . . . . . . . . . . . . . . . . . . . |
|   Name . . . . . . . . . . . . . . . . . . . . . . . . . |
|   Work Location . . . . . . . . . . . . . . . . . . . . . |
|   Telephone No . . . . . . . . . . . . . . . . . . . . . . |
|                                                          |
| Authorities                                           |
|   Administrator . . . . . . . . . . . . . . . . . . . . . |
|   VTAM trace . . . . . . . . . . . . . . . . . . . . . . . |
|   Response time . . . . . . . . . . . . . . . . . . . . . |
|   VTAM console . . . . . . . . . . . . . . . . . . . . . . |
|                                                          |
| F1=Help  F4=Prompt  F12=Cancel                         |
+---------------------------------------------------------+
```

Figure 171. Add User Authorities Panel

This panel contains two sections. Complete the first section, which describes user identification, as follows:

**User ID**  Individual user's system logon ID.

**Department**  User's department. This field is informational only.

**Name**  User's name. This field is informational only.

**Work Location**  User's building or site identification. This field is informational only.

**Telephone No**  User's telephone number or extension. This field is informational only.
The second part of the User Authorities panel in the previous figure describes the authorities. There are two levels of user access:

1. administrator
2. operator

The administrator, who manages User Authorities, has full product access. To grant administrative authority, enter YES under the ADM column. All of the remaining access columns automatically convert to YES.

The operator level of authority is set by the administrator. The following are the operator authorities that may be granted to each user:

- **VTAM trace**: Start a VTAM trace (Yes/No).
- **Response Time**: Initiate response time monitoring (Yes/No).
- **VTAM console**: Issue VTAM console commands (Yes/No).

For all authorities, the default is No.
Change User Authorities

To change access levels for an existing user authorization, enter action code \# (Change) next to the user ID on the User Authorities panel. The Change User Authorities panel appears. Modify the current values in the fields or follow the procedure described in “Add User Authorities” on page 341.

Figure 172. Change User Authorities Panel
Delete User Authorities

To delete an existing user authorization, enter action code D (Delete) next to the appropriate user ID on the User Authorities panel. The Delete User Authorities panel appears for verification. Check to see if the information is correct. If so, press Enter to perform the deletion; otherwise press F12 to cancel.

Figure 173. Delete User Authorities Panel
User Authorities Navigation

- Action Bar
  - KONDOPTD
    - Options Pull-down Menu
      - If not Administrator
        - If Administrator
          - A: KONDOUAA - Add User Authorities
          - C: KONDOUAC - Change User Authorities
          - D: KONDOUAX - Delete User Authorities
          - V: KONDOUAV - View User Authorities
Appendix A. Exceptions

An OMEGAMON II exception occurs when a condition has exceeded its specified threshold. Thresholds are specified under the Monitoring Options selection on the Options pull-down.

When you enter the X (Exceptions) action code on the main status panel, you see a list of exception conditions that occurred for the selected VTAM component. To display all exceptions, select Exceptions on the main status Goto pull-down. To display exceptions for a specific resource, enter action code X (Exceptions) next to the resource on a detail panel.

On any exceptions panel, you can enter the S action code (Show recommendations) next to a selected exception to view a panel that provides:

- a detailed explanation of the exception
- performance objectives
- recommendations for improving the condition
- background information
- how to set thresholds

EX101 Total buffers in buffer pool name is nnnn (over by mmmm).
Explanation: Too many buffers are allocated in the named buffer pool. The exception type is BP.

EX102 Buffer pool buffer pool name has nnnn storage requests queued (over by mmmm).
Explanation: Too many storage requests are queued in the named buffer pool. The exception type is BP.

EX103 Buffer pool buffer pool name has nnnn active extents allocated (over by mmmm).
Explanation: Too many active extents are allocated in the named buffer pool. The exception type is BP.

EX104 Buffer pool buffer pool name has entered slowdown. Available buffers is nnnn.
Explanation: The named buffer pool has entered slowdown mode; only nnnn buffers remain available. The exception type is BP.

EX105 Buffer pool buffer pool name has expanded nnnn times during most recent sample.
Explanation: The named buffer pool has expanded repeatedly; this may indicate thrashing. The exception type is BP.

EX106 Buffer pool buffer pool name is thrashing.
Explanation: The named buffer pool is thrashing. The exception type is BP.
EX107  *user* is using excessive buffers in the CRPL buffer pool. Number of buffers used is *nnnn* (**mmmm** percent of the pool).
**Explanation:** The user specified is using excessive buffers in the Copy Request Parameter List (CRPL) pool. The exception type is BP.

EX201  **Subarea subarea name**, virtual route route number is blocked.
**Explanation:** The specified virtual route to *subarea name* is blocked. The exception type is VR.

EX202  **Subarea subarea name**, virtual route route number is transferring *nnnn* PIUs/sec (over by *mmmm*/sec).
**Explanation:** The specified virtual route to *subarea name* is sending an excessive amount of Path Information Units (PIUs) each second. The exception type is VR.

EX203  **Subarea subarea name**, virtual route route name has *nnnn* LU-LU sessions (over by *mmmm*).
**Explanation:** The specified virtual route to *subarea name* has too many logical unit-to-logical unit (LU-LU) sessions active. The exception type is VR.

EX204  **Subarea subarea name**, virtual route route name is at minimum pacing window size.
**Explanation:** The specified virtual route to *subarea name* is operating at the minimum pacing window size. The exception type is VR.

EX301  **CTC CTC name** has been in slowdown mode *nnnn* times.
**Explanation:** The named CTC has been in slowdown mode *nnnn* times within a TNSTAT interval. The exception type is CTC.

EX302  **CTC CTC name** has *nnnn* TSCBs waiting transmission on its outbound pending queue (over by *mmmm*).
**Explanation:** The named CTC has too many outbound transmission subsystem control blocks (TSCBs) waiting to be transmitted. The exception type is CTC.

EX303  **CTC name** has *nnnn* percent of its I/O due to priority PIUs (over by *mmmm%*).
**Explanation:** The named CTC I/O has too high a percentage of priority PIUs. The exception type is CTC.

EX304  **CTC CTC name** is transmitting only *nnnn* outbound PIUs per channel write (under by *mmmm*).
**Explanation:** The named CTC is transmitting fewer than the specified minimum PIUs per channel write. The exception type is CTC.

EX305  **MPC group mpcname** is transmitting only *nnnn* outbound PIUs per SIO (under by *mmmm*).
**Explanation:** The average number of outbound PIUs (OPIUs) per start I/O (SIO) for the MPC group is lower than the specified threshold. The exception type is CTC.
EX306  MPC group *mpcname* has had QSWEEP data blocks initiated *nnnn* times.
Explanation: One or more QSWEEP data blocks have been initiated for the MPC group. The exception type is CTC.

EX307  MPC group *mpcname* has had TSWEEP data blocks initiated *nnnn* times.
Explanation: One or more TSWEEP data blocks have been initiated for the MPC group. The exception type is CTC.

EX308  MPC group *mpcname*, subchannel *subchannelname* has a buffer utilization percentage of *nnnn* (over by *mmmm* percent).
Explanation: The buffer utilization percentage for the MPC subchannel exceeds the specified threshold. The exception type is CTC.

EX309  MPC group *mpcname*, subchannel *subchannelname* has been in a slowdown mode *nnnn* times.
Explanation: The MPC subchannel has entered slowdown mode one or more times. The exception type is CTC.

EX401  NCP *NCP name* has been in slowdown mode *nnnn* times.
Explanation: The named NCP has been in slowdown mode *nnnn* times within a TNSTAT interval. The exception type is NCP.

EX402  NCP *NCP name* has *nnnn* TSCBs waiting transmission on its outbound pending queue (over by *mmmm*).
Explanation: The named NCP has too many outbound transmission subsystem control blocks (TSCBs) waiting to be transmitted. The exception type is NCP.

EX403  NCP *NCP name* is transmitting only *nnnn* outbound PIUs per channel write (under by *mmmm*).
Explanation: The named NCP is transmitting fewer than the specified minimum PIUs per channel write. The exception type is NCP.

EX404  NCP *NCP name* is receiving *nnnn* inbound PIUs per channel read (under by *mmmm*).
Explanation: The named NCP is receiving fewer than the minimum PIUs per channel read. The exception type is NCP.

EX405  NCP *NCP name* percent of ATTN to channel read is *nnnn* (over by *mmmm* %).
Explanation: The named NCP is receiving too high a percentage of attentions (ATTN) to channel reads. The exception type is NCP.

EX501  LOCAL *LOCAL name* has been in slowdown mode *nnnn* times.
Explanation: The named LOCAL has been in slowdown mode *nnnn* times within a TNSTAT interval. The exception type is LOCAL.
EX601  GROUP=GROUP name nnnn of mmmm terminals exceeded the NETWORK|HOST|TOTAL response time WARNING|CRITICAL threshold of llll seconds.
Explanation:  Response time monitoring of a group of terminals determined that one or more terminal's host, network, or total response of llll seconds exceeded either the warning or critical threshold established for the group. The exception type is RT.

EX901  NPALU npaname for NCP ncpname failed.
Explanation:  Performance data for the named NCP cannot be collected because OMEGAMON II is unable to connect to the named NPALU or the connection to the NPALU is lost. The exception type is CCU.

EX902  CCU cycle utilization for NCP ncpname (NPALU npaname) was nn.n% (over by mm%).
Explanation:  CCU cycle utilization for the named NCP was too high during the sample interval. Available CCU cycles are essential for efficient network operation. The exception type is CCU.

EX903  Buffer utilization for ncpname (NPALU npaname) was nn.n% (over by mm%).
Explanation:  CCU buffer utilization for the named NCP was too high during the sample interval. Available NCP buffers are essential for efficient network operation. Insufficient buffers can lead to slowdown. The exception type is CCU.

EX904  NCP ncpname (NPALU npaname) was in slowdown mode nn.n% of the time (over by mm%).
Explanation:  The named NCP was in slowdown mode for too high a percentage during the sample interval. Slowdown adversely affects response times and throughput. The exception type is CCU.

EX905  NCP ncpname (NPALU npaname) had nnnnnn PIUs on the intermediate queue (over by mmmmm).
Explanation:  There were too many PIUs on the named NCP’s channel intermediate queue (waiting to go to the host) at the end of the sample interval. Over time, this can indicate a bottleneck on the channel to VTAM. The exception type is CCU.

EX906  NCP ncpname (NPALU npaname) had nnnnnn PIUs on the channel hold queue (over by mmmmm).
Explanation:  There were too many PIUs on the named NCP’s channel hold queue (waiting to go to the PUs and LUs in the network) at the end of the sample interval. Over time, this can indicate a bottleneck in VTAM or on the channel to VTAM. The exception type is CCU.
EX907 Line utilization for SDLC/BSC line linename (NPALU npaname) was nn.n% (over by mm%).
Explanation: The named SDLC/BSC line used too much of it's transmission capacity during the sample interval. Excessive line utilization degrades response times. The exception type is LINE.

EX908 SDLC/BSC Line linename (NPALU npaname) had nn.n% retransmitted bytes (over by mm%).
Explanation: The named SDLC/BSC line had too high a percentage of retransmitted bytes during the sample interval. Retransmissions increase line utilization and degrade performance. The exception type is LINE.

EX909 SDLC/BSC Line linename (NPALU npaname) had nn.n% retransmitted PIUs (over by mm%).
Explanation: The named SDLC/BSC line had too high a percentage of retransmitted PIUs during the sample interval. Retransmissions increase line utilization and degrade performance. The exception type is LINE.

EX910 SDLC/BSC Line linename (NPALU npaname) had nn.n% temporary errors (over by mm%).
Explanation: The named SDLC/BSC line had too high a percentage of temporary errors during the sample interval. Temporary errors cause retransmissions, which increase line utilization and degrade response times. The exception type is LINE.

EX911 SDLC/BSC Line linename (NPALU npaname) had nn.n% non-productive polls (over by mm%).
Explanation: The named SDLC/BSC line had too high a percentage of non-productive polls (polls where no data was returned) during the sample interval. This is generally not a concern unless CCU utilization is too high. The exception type is LINE.

EX912 SDLC/BSC Line linename (NPALU npaname) had nnnnnn PIUs on the outbound queue (over by mmmmm).
Explanation: The named SDLC/BSC line had too many PIUs on the outbound queue (in the NCP waiting to go to the line) at the end of the sample interval. Over time, this can indicate that line utilization or error rate is too high. The exception type is LINE.

EX913 SDLC/BSC Line linename (NPALU npaname) was detected as idle.
Explanation: The named SDLC/BSC line was idle during the sample interval. This is a critical problem. The exception type is LINE.

EX914 Line utilization for PU puname (NPALU npaname) was nn.n% (over by mm%).
Explanation: The named PU used too much of the line's capacity during the sample interval. Excessive line utilization degrades response times. The exception type is PU.
EX915  PU *puname* (NPALU *npaname*) had *nn.n%* retransmitted bytes (over by *mm%*).
Explanation: The named PU had too high a percentage of retransmitted bytes during the sample interval. Retransmissions increase line utilization and degrade response times. The exception type is PU.

EX916  PU *puname* (NPALU *npaname*) had *nn.n%* retransmitted PIUs (over by *mm%*).
Explanation: The named PU had too high a percentage of retransmitted PIUs during the sample interval. Retransmissions increase line utilization and degrade response times. The exception type is PU.

EX917  PU *puname* (NPALU *npaname*) had *nn.n%* temporary errors (over by *mm%*).
Explanation: The named PU had too high a percentage of temporary errors during the sample interval. Temporary errors cause retransmissions, which increase line utilization and degrade response times. The exception type is PU.

EX918  PU *puname* (NPALU *npaname*) had *nn.n%* non-productive polls (over by *mm%*).
Explanation: The named PU had too high a percentage of non-productive polls (polls where no data is returned) during the sample interval. This is generally not a concern, unless CCU utilization is too high. The exception type is PU.

EX919  PU *puname* (NPALU *npaname*) had *nnnnnn* PIUs on the outbound queue (over by *mmmmmm*).
Explanation: There were too many PIUs on the outbound queue (in the NCP waiting to go to the named PU) at the end of the sample interval. Over time, this can indicate high line utilization or high error rate. The exception type is PU.

EX920  PU *puname* (NPALU *npaname*) was detected as idle.
Explanation: The named PU was idle during the sample interval. This is a critical problem. The exception type is PU.

EX921  Line utilization for LU *luname* (NPALU *npaname*) was *nn.n%* (over by *mm%*).
Explanation: The named LU was using too much of the line's capacity during the sample interval. Excessive line utilization degrades response times. The exception type is LU.

EX922  PIU transmission rate for LU *luname* (NPALU *npaname*) was *nn.nn%* (over by *mm%*).
Explanation: The named LU had too high a PIU transmission rate (PIUs per minute) during the sample interval. High PIU rate contributes to high line utilization, which degrades response times. The exception type is LU.
EX923  LU *luname* (NPALU *npaname*) had *nnnnnn* PIUs on the outbound queue (over by *mmmmmm*).
Explanation: There were too many PIUs on the outbound queue (in the NCP waiting to go to the named LU) at the end of the sample interval. Over time, this can indicate high line utilization or high error rate. The exception type is LU.

EX924  LU *luname* (NPALU *npaname*) was detected as idle.
Explanation: The named LU was idle during the sample interval. Generally, this is not a problem. The exception type is LU.

EX925  TIC utilization for Token-Ring Physical Link *trplname* (NPALU *npaname*) was *nn.n%* (over by *mm%*).
Explanation: The named token-ring physical link used too much of the TIC’s capacity during the sample interval. Excessive TIC utilization degrades response times. The exception type is TRPL.

EX926  The congestion rate for token-ring physical link *trplname* (NPALU *npaname*) was *nn.n%* (over by *mm%*).
Explanation: The named token-ring physical link had too high a congestion rate during the sample interval. The NCP is trying to transmit data to the token-ring and there is more data than adapter buffers can hold. The exception type is TRPL.

EX927  Token-Ring Physical Link *trplname* (NPALU *npaname*) had *nn.n%* retransmitted bytes (over by *mm%*).
Explanation: The named token-ring physical link had too high a percentage of retransmitted bytes during the sample interval. Retransmissions increase link utilization and degrade performance. The exception type is TRPL.

EX928  Token-Ring Physical Link *trplname* (NPALU *npaname*) had *nn.n%* retransmitted IFrames (over by *mm%*).
Explanation: The named token-ring physical link had too high a percentage of retransmitted IFrames during the sample interval. Retransmissions increase link utilization and degrade performance. The exception type is TRPL.

EX929  Token-Ring Physical Link *trplname* (NPALU *npaname*) transmitted *nnnnnn* frames per minute (over by *mmmmmm*).
Explanation: The named token-ring physical link had too high a frame rate (frames per minute) during the sample interval. High frame rate can cause high TIC utilization, which can degrade token-ring performance. The exception type is TRPL.

EX930  Token-Ring Physical Link *trplname* (NPALU *npaname*) had a connection count of *nn* (over by *mm*).
Explanation: The named token-ring physical link had too high a connection count during the sample interval. This can indicate high activity. The exception type is TRPL.
EX931 Token-Ring Physical Link trplname (NPALU npaname) had nnnnnn IFrames on the outbound queue (over by mmmmmmm).
Explanation: There were too many IFrames on the outbound queue (in the NCP waiting to go to the named token-ring physical link) at the end of the sample interval. Over time, this can indicate a bottleneck in the TIC. The exception type is TRPL.

EX932 Token-Ring Physical Link trplname (NPALU npaname) was detected as idle.
Explanation: The named token-ring physical link was idle during the sample interval. This is a critical problem. The exception type is TRPL.

EX933 Token-Ring Logical Link trllname (NPALU npaname) had nn.n% retransmitted bytes (over by mm%).
Explanation: The named token-ring logical link had too high a percentage of retransmitted bytes during the sample interval. Retransmissions increase link utilization and degrade performance. The exception type is TRLL.

EX934 Token-Ring Logical Link trllname (NPALU npaname) had nn.n% retransmitted IFrames (over by mm%).
Explanation: The named token-ring logical link had too high a percentage of retransmitted IFrames during the sample interval. Retransmissions increase link utilization and degrade performance. The exception type is TRLL.

EX935 Token-Ring Logical Link trllname (NPALU npaname) had nn.n% reply timeouts (over by mm%).
Explanation: The named token-ring logical link had too high a percentage of reply timeouts during the sample interval. The link is not responding to the NCP. This can indicate a problem with a station on the token-ring. The exception type is TRLL.

EX936 Token-Ring Logical Link trllname (NPALU npaname) transmitted nnnnnn frames per minute (over by mmmmmmm).
Explanation: The named token-ring logical link had too high a frame rate (frames per minute) during the sample interval. A station on the token-ring is very active, which increases TIC and token-ring utilization. The exception type is TRLL.

EX937 Token-Ring Logical Link trllname (NPALU npaname) had nnnnnn IFrames on the outbound queue (over by mmmmmmm).
Explanation: There were too many IFrames on the outbound queue (in the NCP waiting to go to the named token-ring logical link) at the end of the sample interval. Over time, this can indicate a bottleneck on the associated physical link. The exception type is TRLL.

EX938 Token-Ring Logical Link trllname (NPALU npaname) was detected as idle.
Explanation: The named token-ring logical link was idle during the sample interval. This is a critical problem. The exception type is TRLL.
EX939  X.25 MCH link linkname (NPALU npaname) utilization was nn.n% (over by mm.m%)
Explanation: Utilization of the X.25 multichannel (MCH) link exceeded the specified threshold percentage. Excessive link utilization degrades response times. The exception type is X25L.

EX940  X.25 MCH link linkname (NPALU npaname) retransmitted bytes was nn.n% (over by mm.m%)
Explanation: The percentage of retransmitted bytes, compared to total bytes transmitted, exceeded the specified threshold percentage. Retransmissions increase link utilization and degrade performance. The exception type is X25L.

EX941  X.25 MCH link linkname (NPALU npaname) retransmitted IFrames was nn.n% (over by mm.m%)
Explanation: The percentage of retransmitted IFrames, compared to total IFrames transmitted, exceeded the specified threshold percentage. Retransmissions increase link utilization and degrade performance. The exception type is X25L.

EX942  X.25 MCH link linkname (NPALU npaname) receiver not ready (RNR) packets was nn.n% (over by mm.m%)
Explanation: The percentage of receiver not ready (RNR) frames, compared to total frames transmitted, exceeded the specified threshold percentage. This can indicate heavy traffic on the link. The exception type is X25L.

EX943  X.25 MCH link linkname (NPALU npaname) virtual circuit (VC) utilization was nn.n% (over by mm.m%)
Explanation: The percentage of virtual circuits (VCs) in use, compared to the maximum number of VC connections defined in the NCP generation, exceeded the specified threshold percentage. Consider increasing link capacity or bandwidth. The exception type is X25L.

EX944  X.25 MCH link linkname (NPALU npaname) error rate per kilobyte was nnnnnn (over by mmmmmmm)
Explanation: The number of errors transmitted per kilobyte exceeded the specified threshold rate. Errors cause retransmissions which increase link utilization and degrade response times. The exception type is X25L.

EX945  X.25 MCH link linkname (NPALU npaname) outbound queue length was nnnnnn (over by mmmmmmm)
Explanation: The number of IFrames on the outbound queue in the NCP, waiting to be sent through the multichannel (MCH) link, exceeded the specified threshold queue length. Over time, this can indicate that link utilization or number of retransmissions is too high. The exception type is X25L.

EX946  X.25 MCH link linkname (NPALU npaname) was detected as idle.
Explanation: No bytes were transmitted on the X.25 multichannel (MCH) link during the sample interval. This is a critical problem. The exception type is X25L.
EX947  X.25 VC *vcname* (NPALU *npaname*) MCH link utilization was *nn.n%* (over by *mm.m%*)

**Explanation:** The percentage of the multichannel (MCH) link used by the X.25 virtual circuit (VC) exceeded the specified threshold percentage. Excessive link utilization degrades response times. The exception type is X25V.

EX948  X.25 VC *vcname* (NPALU *npaname*) retransmitted bytes was *nn.n%* (over by *mm.m%*)

**Explanation:** The percentage of retransmitted bytes, compared to total bytes transmitted, exceeded the specified threshold percentage. Retransmissions increase link utilization and degrade response times. The exception type is X25V.

EX949  X.25 VC *vcname* (NPALU *npaname*) retransmitted IFrames was *nn.n%* (over by *mm.m%*)

**Explanation:** The percentage of retransmitted IFrames, compared to total IFrames transmitted, exceeded the specified threshold percentage. Retransmissions increase link utilization and degrade response times. The exception type is X25V.

EX950  X.25 VC *vcname* (NPALU *npaname*) D-Bit packets was *nn.n%* (over by *mm.m%*)

**Explanation:** The percentage of D-Bit packets, compared to total packets transmitted, exceeded the specified threshold percentage. Review applications' requirements for D-Bit usage. The exception type is X25V.

EX951  X.25 VC *vcname* (NPALU *npaname*) error rate per kilobyte was *nnnnnn* (over by *mmmmmm*)

**Explanation:** The number of errors transmitted per kilobyte exceeded the specified threshold rate. Errors cause retransmissions which increase link utilization and degrade response times. The exception type is X25V.

EX952  X.25 VC *vcname* (NPALU *npaname*) outbound queue length was *nnnnnn* (over by *mmmmmm*)

**Explanation:** The number of IFrames on the outbound queue in the NCP, waiting to be sent through the virtual circuit (VC), exceeded the threshold queue length. Over time, this can indicate high link utilization or high error rate. The exception type is X25V.

EX953  X.25 VC *vcname* (NPALU *npaname*) was detected as idle.

**Explanation:** No bytes were transmitted on the virtual circuit (VC) during the sample interval. This is a critical problem. The exception type is X25V.

EX954  MCH link utilization for X.25 LU *luname* (NPALU *npaname*) was *nn.n%* (over by *mm.m%*).

**Explanation:** The X.25 LU used too much of the multichannel (MCH) link's capacity. Excessive link utilization degrades response times. The exception type is X25U.
EX955  PIU transmission rate for X.25 LU luname (NPALU npaname) was nnnnnn (over by mmmmmm).
Explanation: The number of PIUs transmitted per minute for the X.25 LU exceeded the specified threshold rate. High PIU rate contributes to high MCH link utilization which degrades response times. The exception type is X25U.

EX956  X.25 LU luname (NPALU npaname) had nnnnnn PIUs on the outbound queue (over by mmmmmm).
Explanation: The number of PIUs on the outbound queue in the NCP, waiting to be sent to the X.25 LU, exceeded the specified threshold length. Over time, this can indicate high MCH link utilization or high error rate. The exception type is X25U.

EX957  X.25 LU luname (NPALU npaname) was detected as idle.
Explanation: The X.25 LU was idle during the sample interval. Generally, this is not a problem. The exception type is X25U.
Appendix B.
OMEGAVIEW Zoom

Chapter Contents

Overview ........................................... 360
Zooming into OMEGAMON II .................. 360
Default Zoom Destinations .................. 362
Alternate Zoom Destinations ............... 363
  Exceptions - Second Choice ............ 363
  Main Status - Third Choice .......... 363
Usage ............................................. 364
  Profile Synchronization .............. 364
  OMEGAVIEW Customized Panels ....... 364
  OMEGAVIEW Zoom References .......... 365
Overview

In OMEGAVIEW® you can select a status bar and zoom into a direct session with OMEGAMON II for VTAM so that you can investigate the cause of the warning or critical condition indicated.

You can automatically navigate to one of several OMEGAMON II screens that shows you more detail about why the selected basic status light indicated a problem.

Zooming into OMEGAMON II

Zooming into OMEGAMON II from OMEGAVIEW is described below:

1. There are two different ways to zoom from an OMEGAMON II status light. Whether or not you can choose the zoom destination depends on how you set the Confirm Zoom to Session pop-up in OMEGAVIEW.
   a. If you enabled the Confirm Zoom to Session pop-up in OMEGAVIEW, you can select your zoom destination from a menu of zoom destination choices that are displayed on the pop-up.
   b. If you disabled the Confirm Zoom to Session pop-up in OMEGAVIEW, you will zoom directly to the default zoom destination.

2. Depending on Step 1 above, you will arrive at the selected or default OMEGAMON II panel as shown later in this chapter. Navigate within OMEGAMON II as necessary.

3. When you are ready to return to OMEGAVIEW, press the OMEGAVIEW trigger that you defined in OMEGAVIEW.

The following figure illustrates the relationship between OMEGAVIEW zoom source panels and OMEGAMON II zoom destination panels, when the OMEGAVIEW Confirm Zoom pop-up is enabled. (The first zoom choice is also the default zoom destination, which is used when the Confirm Zoom pop-up is disabled.)
Figure 174. OMEGAVIEW to OMEGAMON II for VTAM Zoom Overview
Default Zoom Destinations

Following is a list of the default (first) zoom destination choices for each of the basic OMEGAVIEW status lights from which you can zoom.

Workload Status
   Average Response Time panel. See Figure 85 on page 192.

Buffer Pool Resource Status
   Buffer Pools Status Display panel. See Figure 39 on page 98.

Virtual Route Resource Status
   Virtual Route Analysis panel. See Figure 53 on page 122.

VTAM Environment Resource Status
   VTAM Environmental Summary panel. See Figure 102 on page 231.

NCP Performance Status
   NCP Status Summary panel. See the OMEGAMON II for VTAM NCP Monitoring Guide.

CTC TNSTATS Alert
   CTC TNSTATS - List of CTCs panel. See Figure 64 on page 149.

NCP TNSTATS Alert
   NCP TNSTATS - List of NCPs panel. See Figure 77 on page 167.

LOCAL TNSTATS Alert
   LOCAL TNSTATS - List of LOCALs panel. See Figure 80 on page 175.
Alternate Zoom Destinations

In addition to the default or first zoom destination choice, you have the choice of one or two alternate zoom destinations.

Exceptions - Second Choice

An alternate zoom destination or second choice for each basic status bar (except Response Time and VTAM Environment) is the associated Exceptions panel.

For example, when you zoom from the basic Buffer Pools status light and choose the second destination, you will zoom to the Buffer Pools Exceptions panel; when you zoom from the basic Virtual Route status light, you will zoom to the Virtual Route Exceptions panel.

Main Status - Third Choice

If you zoom from any basic status light, the other alternate or third zoom destination choice is the main status panel. See Figure 18 on page 50.
Usage

The benefit of this feature is that you can zoom *directly* to an OMEGAMON II panel that provides information about the selected OMEGAVIEW status light.

After you zoom into OMEGAMON II, you can navigate normally within the product. If you need more information than the zoom destination panel provides about the cause of the warning or critical OMEGAVIEW status light, you can investigate further within OMEGAMON II.

An OMEGAVIEW user can diagnose a variety of problems detected by OMEGAMON II without being thoroughly acquainted with OMEGAMON II. The more experienced OMEGAMON II user saves time by letting the zoom feature automatically navigate to the panel most likely to explain the problem.

Profile Synchronization

When you zoom to an OMEGAMON II session to investigate problems, you want the response time profile used in OMEGAMON II to be the same as the response time profile in OMEGAVIEW.

If your product administrator defined a response time profile for the OMEGAVIEW collector session user ID, any user who zooms into OMEGAMON II automatically operates under the same profile as the collector session.

For more administrator information, see “OMEGAVIEW Considerations” on page 339.

OMEGAVIEW Customized Panels

In addition to the OMEGAVIEW Default Status panel, if your custom-designed OMEGAVIEW panels include any of the OMEGAMON II for VTAM basic status lights, you can zoom from them to the destinations described in “Default Zoom Destinations” on page 362, “Alternate Zoom Destinations” on page 363, and “Main Status - Third Choice” on page 363.
For more information about this feature, see

- the *OMEGAMON II for VTAM Configuration and Customization Guide* for requirements and installation instructions
- the OMEGAVIEW documentation set for OMEGAVIEW zoom procedures and panel customization
Appendix C.
Candle Customer Support

Introduction

Candle Corporation offers a comprehensive maintenance and support plan to ensure you realize the greatest value possible from your Candle software investments. We have more than 200 technicians worldwide, committed to providing you with prompt resolutions to your support requests.

Customer Support hours of operation are from 5:30 A.M. to 5:00 P.M., Pacific Time. In the event of an after-hours or weekend emergency, Candle's computerized call management system ensures that a technician will return your call within one hour. For customers located outside of North America, after-hours and weekend support is provided by Candle Customer Support locations in the United States.

Electronic Support

Candle provides information and support services using

• Candle's home page at www.candle.com. You can use the Candle Web site to
  – open problem records
  – access maintenance information
  – order products or maintenance
  – access IBM compatibility information
  – download fix packs for distributed products
  – read news and alerts
  – scan a list of scheduled Candle education classes

• Candle Electronic Customer Support (CECS), an electronic customer support facility. You can access this facility through the IBM Global Network. You can use CECS to
  – open problem records
  – search our database for solutions to known problems
  – look for answers to commonly asked questions
  – read news and alerts
  – scan a list of scheduled Candle education classes

Both CECS and the Candle Web site are available 24 hours a day, 7 days per week.
Telephone Support

Our support network consists of product specialists who work with you to solve your problem.

Candle uses an online problem management system to log and track all support requests. Your request is immediately routed to the appropriate technical resource.

When you call to report a problem, please have the following information:

- your Candle personal ID (PID) number
- the release level of the Candle product
- the release level of IBM or other vendor software
- identifying information and dates of recently applied maintenance to your Candle product or IBM product
- a detailed description of the problem (including the error message) and the events preceding the problem
- a description of any unusual events that occurred before the problem
## Customer Support Phone Numbers

<table>
<thead>
<tr>
<th></th>
<th>Telephone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>North America</strong></td>
<td>(800) 328-1811</td>
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</tr>
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<td></td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
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</tr>
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</tr>
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</tr>
</tbody>
</table>

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201 North Douglas Street
El Segundo, CA 90245

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## Index

### Numerics

<table>
<thead>
<tr>
<th>Numerical</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3x74 SNA control units</td>
<td>174</td>
</tr>
</tbody>
</table>

### A

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABENDS command</td>
<td>47</td>
</tr>
<tr>
<td>ACB control block</td>
<td>284, 288, 298</td>
</tr>
<tr>
<td>access levels</td>
<td></td>
</tr>
<tr>
<td>administrator</td>
<td>338, 342</td>
</tr>
<tr>
<td>changing</td>
<td>338</td>
</tr>
<tr>
<td>operator</td>
<td>342</td>
</tr>
<tr>
<td>accessing resource analysis</td>
<td>79</td>
</tr>
<tr>
<td>ACDEB control block</td>
<td>298</td>
</tr>
<tr>
<td>acquired VTAM locks</td>
<td>252</td>
</tr>
<tr>
<td>action bar</td>
<td>28</td>
</tr>
<tr>
<td>fastpath</td>
<td>32</td>
</tr>
<tr>
<td>keywords</td>
<td>29</td>
</tr>
<tr>
<td>mnemonic entries</td>
<td>32</td>
</tr>
<tr>
<td>pull-down menus</td>
<td>29</td>
</tr>
<tr>
<td>action codes</td>
<td>33</td>
</tr>
<tr>
<td>instructions</td>
<td>39</td>
</tr>
<tr>
<td>trace</td>
<td>206</td>
</tr>
<tr>
<td>activating</td>
<td></td>
</tr>
<tr>
<td>autorefresh</td>
<td>40</td>
</tr>
<tr>
<td>response time monitoring</td>
<td>191</td>
</tr>
<tr>
<td>active sessions</td>
<td>286</td>
</tr>
<tr>
<td>adding</td>
<td></td>
</tr>
<tr>
<td>response time resources</td>
<td>188</td>
</tr>
<tr>
<td>trace definition</td>
<td>207</td>
</tr>
<tr>
<td>user authorization</td>
<td>341</td>
</tr>
<tr>
<td>address space</td>
<td>234</td>
</tr>
<tr>
<td>active sessions</td>
<td>286</td>
</tr>
<tr>
<td>analysis of</td>
<td>287</td>
</tr>
<tr>
<td>applications</td>
<td>283–305</td>
</tr>
<tr>
<td>buffer pool usage</td>
<td>105</td>
</tr>
<tr>
<td>definition, TCP/IP</td>
<td>272</td>
</tr>
<tr>
<td>identifier</td>
<td>286</td>
</tr>
<tr>
<td>name</td>
<td>286</td>
</tr>
<tr>
<td>options, TCP/IP</td>
<td>332</td>
</tr>
<tr>
<td>pending sessions</td>
<td>286</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>271</td>
</tr>
<tr>
<td>type</td>
<td>286</td>
</tr>
</tbody>
</table>

### ADM authority

*See administrator authority*
applid (continued)
sessions 288
state 288
status 288
TCB 299
VTAM definition data 301
ASID identifier 286
ATCSTRcc member 235
attention interrupt 164, 174
ATTN TNSTAT 146, 165, 173
authorities
   administrator 338
types 340
authorizations for applid 302
autorefresh 40

B

background, TCP/IP 268
base allocation 92–93
BASENO parameter 94, 101, 102, 111, 112
BAT job type 287
beep option, main status 42, 54
benefits, TCP/IP 270
blocked virtual route 121
bottleneck, virtual route 121
browsing trace PIUs 215
BS00 buffer pool 94
BUFCAP TNSTAT 146, 147
buffer pools 92–115
   address space usage 105
   allocation problems 100
   application usage 106
   base allocation 92–93
   BASENO 94, 100–102, 111, 112
   below the 16-Mb line 94
   boundary node 94
   BUFSIZE 94
case study 108–115
crpanl exploitation point 111, 112
crpl
   See CRPL buffer pool
dynamic allocation 92–93, 100
exceptions 97, 108, 315
exchange identifier (XID) 94
expansion/contraction 92, 95
extents display 107
fixed storage pools 94
historical reports, SAS 103
I/O buffer pool
   See IO00 buffer pool
buffer pools (continued)
   listings 94
   monitoring options 315
   navigation chart 114
   pageable storage pools 94
   PIUs 96
   priority requests 112
   selecting 98
   setting thresholds 314–316
   slowdown 102
   SLOWPT 94, 111, 112
   START option parameters 94, 96, 99, 111, 113
   static allocation 92–93
   storage usage 93
tcp/ip 273
tcp/ip exceptions 333
   thrashing 96, 101–102, 103, 108–115
   trending 100, 102, 109, 112
trending navigation, CRPL 115
   tuning 97–115
   usage by address space 105
   usage by application 106
   wasted storage 101
   xpanlim 95
   xpanno 95, 102, 111, 112
   xpanpt 95, 111
   bufsize parameter 94

C

C24 storage 232
   below the line 235
   highwater 236
cancel function key 28, 31
Candle Electronic Customer Support (CECS) 367
case studies
   application analysis 302
   blocked virtual route 137
   buffer pools 108
   thrashing 108
ccws (channel command words) 164
CDRM
   See Cross Domain Resource Manager
<table>
<thead>
<tr>
<th>Term</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDRSC, resource analysis</td>
<td>78</td>
</tr>
<tr>
<td>chain length</td>
<td>247</td>
</tr>
<tr>
<td>change</td>
<td></td>
</tr>
<tr>
<td>application thresholds</td>
<td>277</td>
</tr>
<tr>
<td>connection thresholds</td>
<td>275</td>
</tr>
<tr>
<td>device thresholds</td>
<td>278</td>
</tr>
<tr>
<td>RACHSRT value</td>
<td>249</td>
</tr>
<tr>
<td>response time definition</td>
<td>193</td>
</tr>
<tr>
<td>TCP/IP buffer pool thresholds</td>
<td>273</td>
</tr>
<tr>
<td>channel</td>
<td></td>
</tr>
<tr>
<td>See also CTC</td>
<td></td>
</tr>
<tr>
<td>command words</td>
<td>164</td>
</tr>
<tr>
<td>description</td>
<td>142</td>
</tr>
<tr>
<td>number of programs issued</td>
<td>146</td>
</tr>
<tr>
<td>reasons for activating</td>
<td></td>
</tr>
<tr>
<td>CTC</td>
<td>147</td>
</tr>
<tr>
<td>NCP</td>
<td>166</td>
</tr>
<tr>
<td>utilization</td>
<td>145</td>
</tr>
<tr>
<td>CHNRM TNSTAT</td>
<td>146</td>
</tr>
<tr>
<td>CHRD TNSTAT</td>
<td>165, 173</td>
</tr>
<tr>
<td>CHWR TNSTAT</td>
<td>165</td>
</tr>
<tr>
<td>class of service table</td>
<td>118, 128, 295</td>
</tr>
<tr>
<td>clear counts function key</td>
<td>28, 196</td>
</tr>
<tr>
<td>close screen print log</td>
<td>44</td>
</tr>
<tr>
<td>coattailing</td>
<td></td>
</tr>
<tr>
<td>CTC</td>
<td>150</td>
</tr>
<tr>
<td>NCP</td>
<td>169</td>
</tr>
<tr>
<td>tuning to increase</td>
<td>144</td>
</tr>
<tr>
<td>collection session profile, OMEGAVIEW</td>
<td>186, 339, 364</td>
</tr>
<tr>
<td>commands, OMEGAMON II</td>
<td></td>
</tr>
<tr>
<td>ABENDS</td>
<td>47</td>
</tr>
<tr>
<td>ANALYZE</td>
<td>47</td>
</tr>
<tr>
<td>KILLTSO</td>
<td>47</td>
</tr>
<tr>
<td>LOG</td>
<td>47</td>
</tr>
<tr>
<td>SNAP</td>
<td>48</td>
</tr>
<tr>
<td>USERS</td>
<td>48</td>
</tr>
<tr>
<td>VIEW</td>
<td>48</td>
</tr>
<tr>
<td>VTAM</td>
<td>48</td>
</tr>
<tr>
<td>commands, VTAM</td>
<td>71–76</td>
</tr>
<tr>
<td>D NET,BFRUSE</td>
<td>236</td>
</tr>
<tr>
<td>getting help</td>
<td>74</td>
</tr>
<tr>
<td>issuing from command line</td>
<td>74</td>
</tr>
<tr>
<td>pop-up display</td>
<td>74</td>
</tr>
<tr>
<td>retrieving</td>
<td>76</td>
</tr>
<tr>
<td>common area of MVS</td>
<td>238</td>
</tr>
<tr>
<td>CON authority</td>
<td>340</td>
</tr>
<tr>
<td>condensed PIU display</td>
<td>213</td>
</tr>
<tr>
<td>configuration parameter list</td>
<td>234</td>
</tr>
<tr>
<td>configuration, TCP/IP</td>
<td>280</td>
</tr>
<tr>
<td>congestion, VTAM and NCP</td>
<td>120</td>
</tr>
<tr>
<td>connections</td>
<td></td>
</tr>
<tr>
<td>exceptions</td>
<td>334</td>
</tr>
<tr>
<td>selection, TCP/IP</td>
<td>274</td>
</tr>
<tr>
<td>TCP/IP</td>
<td>275</td>
</tr>
<tr>
<td>console</td>
<td>57, 71–76</td>
</tr>
<tr>
<td>APPLID prefix</td>
<td>313</td>
</tr>
<tr>
<td>issuing VTAM commands</td>
<td>72</td>
</tr>
<tr>
<td>constants</td>
<td>261–265</td>
</tr>
<tr>
<td>current settings display</td>
<td>261</td>
</tr>
<tr>
<td>EAS value</td>
<td>264</td>
</tr>
<tr>
<td>host node table</td>
<td>264</td>
</tr>
<tr>
<td>RACCITSZ</td>
<td>264</td>
</tr>
<tr>
<td>RACEAS</td>
<td>264</td>
</tr>
<tr>
<td>RACHNNTSZ</td>
<td>264</td>
</tr>
<tr>
<td>RACHSRT</td>
<td>263</td>
</tr>
<tr>
<td>RACINOPT</td>
<td>265</td>
</tr>
<tr>
<td>RACNTWRE</td>
<td>265</td>
</tr>
<tr>
<td>RACONSRT</td>
<td>263</td>
</tr>
<tr>
<td>RACSASUP</td>
<td>264</td>
</tr>
<tr>
<td>resetting</td>
<td>263</td>
</tr>
<tr>
<td>contraction point (CONTP)</td>
<td>111</td>
</tr>
<tr>
<td>control blocks</td>
<td>297</td>
</tr>
<tr>
<td>controlling trace facility</td>
<td>206</td>
</tr>
<tr>
<td>conventions, documentation</td>
<td>17</td>
</tr>
<tr>
<td>copied RPL storage pool</td>
<td></td>
</tr>
<tr>
<td>See CRPL buffer pool</td>
<td></td>
</tr>
<tr>
<td>COSTAB</td>
<td></td>
</tr>
<tr>
<td>See class of service table</td>
<td></td>
</tr>
<tr>
<td>counting PIUs</td>
<td>186</td>
</tr>
<tr>
<td>CPU usage</td>
<td>232, 241</td>
</tr>
<tr>
<td>critical thresholds</td>
<td></td>
</tr>
<tr>
<td>performance objectives</td>
<td>310</td>
</tr>
<tr>
<td>response time</td>
<td>190</td>
</tr>
<tr>
<td>Cross Domain Resource Manager</td>
<td>148, 231, 233</td>
</tr>
<tr>
<td>cross-domain resource</td>
<td></td>
</tr>
<tr>
<td>See CDRSC</td>
<td></td>
</tr>
<tr>
<td>CRPL buffer pool</td>
<td>94</td>
</tr>
<tr>
<td>buffers in use</td>
<td>113</td>
</tr>
<tr>
<td>definition</td>
<td>94, 97</td>
</tr>
<tr>
<td>exceptions panel</td>
<td>316</td>
</tr>
<tr>
<td>extents display</td>
<td>107</td>
</tr>
<tr>
<td>sample display</td>
<td>59</td>
</tr>
<tr>
<td>start options</td>
<td>99, 111</td>
</tr>
<tr>
<td>thrashing case study</td>
<td>108</td>
</tr>
<tr>
<td>trends</td>
<td>103, 109, 113</td>
</tr>
<tr>
<td>usage by address space</td>
<td>109</td>
</tr>
<tr>
<td>user category</td>
<td>104</td>
</tr>
</tbody>
</table>
CSA
- allocation 232
- highwater 236
- performance 235–236
- TCP/IP usage 268
- tracking 268
- usage 235

CSA24 parameter 235
CSALIMIT parameter 235

CTC
- definition 142
- navigation chart 160
- trending navigation 163
- tuning statistics 145–163
- options 328
- type 148

CTCA
See CTC

CUA standards 26–42
- action bar 28
- colors 34
- command prompt 47
- fastpath methods 32
- function keys 27–28
- panel characteristics 34
- pop-up windows 30
- pull-down menus 29
- selection methods 31–33
- customer support 367

delta SIO count 240

destination node of PIU 213

detecting NCP problems 25

device
  - count 240
  - exceptions 335
  - TCP/IP 278
  - types 240

directory of snapshots 67

displaying
  - function keys 27
  - snapshot 64
  - trace PIUs 212

DLOGMOD parameter 301

documentation conventions 17

documentation set 19

DROP command 275

duplicate snapshot 66

dynamic allocation 92–93, 100

DYPAB control block 256

E

EAS value 264, 301

effects of changing RACHSRT 249

electronic customer support 367

end-to-end response time 182
- feature 58
- monitoring options 323
- response time component 181–199
- trace facility requirement 202

environment information 230–266
- CPU utilization 241
- CSA performance 235
- exceptions 230
- host-specific data 233
- internal trace 242
- I/O distribution 239
- lock analysis 251
- monitoring 230
- paging performance 237
- performance summary 231
- SRT analysis/modeling 247
- user exits 245

ER mapping 122

ETE
See end-to-end response time exception
- action code 48
- application 335
exception (continued)
  buffer pools 315
  connection 334
  device 335
  display 55
  display setting 313
  indicators 53–54
  messages 48, 347–357
  monitoring options 310
  recommendations 37, 56, 347
  response mode 184
  response time 58, 193
  status light 53
  TCP/IP 272
  TCP/IP buffer pool 333
  thresholds 56
exit
  function key 27
  help 246
exits 245–246
  applications analysis 300
  global 232
  SRB mode 301
EXnnn 347
expanded PIU display 213
expansion
  limit (XPANLIM) 95
  number (XPANNO) 95
  point parameter (XPANPT) 95
  point (XPANPT) 111
explicit route 118
  mapping 131
extended frames in use 238
extended help 36

F

F keys
  See function keys
fastpath
  selecting pull-downs and pop-ups 32
  selecting trend displays 180
field-level help 35
finding a snapshot 64
flow control 119–120
FM data 208
FMCB directory table 264
force definite response 190
frames in use 238
frequency distribution of SRT 250
FRR coverage 302
function keys 27
  CUA standards 27–28
  display 39

G
gateways, TCP/IP 279
getting started 23–48
global exits 232
global options 312–313
Goto pull-down 56
group highlighting, response time 195
group monitoring, MPC 148

H

held virtual route 121
help 35–36
  about 36
  command prompt 47
  context-sensitive 35
  exit 246
  extended 36
  field-level 35
  function key 27
  panel-level 35
tutorial 36
  VTAM command 74–75
highlighting response time groups 195
high-priority connections 274, 275
highwater storage 236
historical reports, SAS
  buffer pools 103
  CTC 173
  NCP 173
  Netmaster automatic termination 43
  NetView automatic termination 43
  response time 198
  virtual route 138
hops in virtual route 131
host
  node table 264
  response time 182
  usage 174
hotkey for network manager 43
hours in log file 313

I
IBM TCP/IP address spaces 268
IEAIPSxx 237
implicit action 39
index table 264
indicator of exceptions 53
internal trace 231
  data 244
  options 243
  statistics 242–243
interval, autorefresh 40
I/O
  distribution 239
  increasing buffer size 167
  maximum message pairs 265
  rates 240
I/O buffer pool
  See IO00 buffer pool
IO00 buffer pool 96, 104, 107
  thresholds 316
IPIU TNSTAT 146, 165
ISTPUCWC module 246
ISTRACON module 261

J
job name 231

K
keys help 36
KILLTSO command 47

L
large fixed storage buffer pool
  See LF00 buffer pool
large pageable storage buffer pool
  See LP00 buffer pool
LF00 buffer pool 94
link pack area 238
listing traces 204
local
  analysis 176
  channel usage 174
  definition 142
  listing 175
  navigation chart 178
  performance 174
  SNA controllers 164
  trending navigation 179
  trends 177
  tuning statistics 174, 176
locating snapshot 69
lock analysis 251–261
lockword snapshot 259
lockword-containing control block 258
LOG command 47
log file
  hours in 313
  utilization 330
logical unit
  See LU
logmode
  entries 301
  network manager 43
  vary logon 302
logon activation, response time monitoring 193
LP00 buffer pool 94
LPA
  See link pack area
LU
  distribution 122
  in session with applid 292
  MODETAB 296
  response time 192
  sessions 284
    distribution 136
    virtual route response time 198
LUCB control block 298

M
main status
  beep option 54
  display 50
  navigation chart 52
  navigation from 51
major node 301
MAX C24 storage 236
MAX CSA storage 236
MAX private storage 302
MAXBFRU parameter 147, 166
message beep 39
message control pageable storage pool
See WP00 buffer pool
message IDs 39
messages 48, 347, 357
    exception 48, 347–357
    product 48
modeling facility, SRT 247
MODETAB table 296, 301
monitor list, virtual routes 317, 318
monitoring options 309–336
    administrator authority 310
    buffer pools 314–316
    data display navigation 56
    exception thresholds 56
    global options 312
    menu 311
    network performance 49–59
    performance
        exception displays 55
        exceptions 53
        status display 50
    response time
        module 58
        options 322
    restrictions 310
TCP/IP 331
    trend file utilization 330
    trending information 58
    tuning statistics 325
    virtual route thresholds 317–321
VTAM environment 321
VTAM trace 53
monitoring scope, VRs 317
MPC 142, 151–155
    CTC exception threshold values 328
    group monitoring 148
    navigation chart 161, 162
    READ 148
    subchannel monitoring 148
    trends 158
    WRITE 148
Multipath Channel Support
See MPC
multisession managers 186
MVS
    ESA 268
    release level 234
MVS (continued)
    resources for VTAM 232

N

names and release levels 233
navigation 26–42, 56–57
    Goto pull-down 56
navigation chart
    applications analysis 305
    buffer pool trending, CRPL 115
    buffer pools 114
    CTC TNSTATs 160
    CTC TNSTATS trending 163
    local TNSTATS 178
    local TNSTATs trending 179
    main status 52
    MCP support 161, 162
    NCP TNSTATS 171
    NCP TNSTATs trending 172
    Options pull-down 336
    response times 199
    TCP/IP 281
    trace facility 227
    user authorities 345
    virtual route trending 140
    virtual routes 139
VTAM environment 266
NCP
    analysis 168
    ATTN 165
    BUILD definition statement 166
    channel
        utilization 166
    CHRD 165
    CHWR 165
    coattailing 169
    definition 142
    detecting problems 25
    improving performance 166
    IPIU 165
    listing 167
    MAXBFRU 166
    navigation chart 171
    OPIU 165
    QDEPTH 166
    RDATN 165
    RDBUF 165
    SLODN
        See slowdown

Index 377
NCP (continued)
  SNA controllers 164
toggles 167, 195
trending 169
trending navigation 172
tuning statistics 165, 172
versions supported 26
NETID parameter 233
Netmaster
  access 43
  automatic termination 43
NetView
  access 43
  automatic termination 43
network
  address 234
  control 208
devices 278
environment 231
  ID 231
  LU name 208
  manager options 43
  name 233
  resources, TCP/IP 272
  response time 182
  routers 279
  tuning 49–59
NO LIMIT condition 235
NOTNSTAT condition 144
NSLOOKUP command 275, 279
number of hops 131
NUMEXP value 101

O

OMEGAMON II
  accessing 25
  commands 47
overview 23–48
OMEGAVIEW zoom
  alternate destinations 363
customized panels 364
default destinations 362
exceptions 363
  graphic overview 360
  main status 363
profile synchronization 186, 339, 364
references 365
ways to zoom 360
open virtual route 121
opened applids 285
operator console 71–76
OPIU TNSTAT 146, 165
Options pull-down
  example 38
  navigation chart 336
originating node of PIU 213

P

PAB snapshot 257
PAB-containing control block 256
pacing
  window size 119–120
  trends 134
page-ins 238
paging
  performance 237–238
  rates 232, 237
panel 26–42
  asterisks 34
  characteristics 34
  colors 34
  help 35
  IDs 39
parallel sessions 302
PARMLIB dataset 237
path definition
  See PATH statement
path information units
  See PIUs
PATH statement 118, 126–127
performance monitoring 49–59
  approaches to tuning the network 25
  data display navigation 56
  data trends 58
  exceptions 55
    displays 55
    indicators 53
    thresholds 56
  response time
    installation problems 58
    module 58
    problems 24
    status display 50
    status lights 53
    VTAM trace 53
PING command 275, 279
PIUs
  analyzing trace 216
  browsing trace 215
  condensed display 213
  counting 186
  displaying trace 217
  expanded display 213
  how OMEGAMON II counts 186
I/O buffer pool 96
pacing window 119
summary row contents 213
trace facility 202, 205
trace maximum 313
traffic trending 135
PLU
  See primary LU
pop-up windows 30
portable document format, Adobe 16
PRI TNSTAT 146, 147
primary LU 284, 295
print
  function key 28, 44
  options 38, 44
  snapshot of panel 65
  trace report 225
priority traffic 147, 166
private area of MVS 238
private storage usage 288, 302
processes waiting for locks 254
product messages 48
profile synchronization 186, 339, 364
prompt function key 27
PST control block 298
pull-down menus 29
PWSS parameter 237

Q
QDEPTH
  parameter 147
  TNSTAT 146
queue pointers 263

R
RACCITSZ constant 264
RACEAS constant 264
RACHNTSZ constant 264
RACHSRT constant 247, 263
RACINOPT constant 265
RACNTWRE constant 265
RACONSRT constant 263
RACSASUP constant 264
RAP control block 299
RDATN TNSTAT 164, 165
RDBUF TNSTAT 146, 165
read attention
  See RDATN TNSTAT
read channel programs 165, 173
REC ANY count 291
recommendations, exception 37, 56, 347
recording interval 312
recording status, response time 324
refreshing
  function key 27
  response times 195
release
  current MVS level 234
  current VTAM level 233
  NCP levels supported 26
  VTAM levels supported 26
request/response header
  See RH data
request/response unit
  See RU data
requirements, TCP/IP 268
resource analysis 56, 57, 77–87
  accessing 79
  ANALYZE command 47
  applid 78
  CDRSC 78
  Goto pull-down 57, 80
  IO00 applid 106
  response time 195
terminal 78
types 78
response time 26, 181–199
  adding resource to monitor 188
  average 184
  by subarea 196–199
  by virtual route 196–199
  calculation 185
  critical thresholds 190
cross-domain 182
response time (continued)
  data collection 184, 322
  definite response 184, 190
  end-to-end 182, 184, 323
  exception indicator 58
  exception response 184
  historical reports, SAS 198
  host 182
  installation problems 58
  module 58
  monitoring 188–195
  multisession managers 186
  navigation chart 199
  network 182
  obtaining 188
  options 322–325
  profile synchronization 186, 339, 364
  recording status 324
  refreshing 195
  SAS graphs 198
  service-level reports, SAS 198
  sessions monitored 183
  SMF option 322–325
  status light 187
  threshold applies to 190
  trace requirements for 242
  types 182
    virtual route 129
  warning thresholds 190
  restarting a trace 209
  resume address storage 260
  retrieving a snapshot 64
  reviewing a trace definition 211
  RH data 219–220
  route
    explicit 118
    physical 118
    virtual 117–140
      historical reports, SAS 138
      number 118
      pacing 119–120
      response time 129, 196–199
      status 121
      trends 132–136
      tuning 118, 126–130
      window size 127
  routers, network 279
  RPL control block 294
  RT authority 340
  RT command 195
  RU data 221–222
  S
  SAA standards 26–42
    action bar 28
    colors 34
    command prompt 47
    fastpath methods 32
    function keys 27–28
    panel characteristics 34
    pop-up windows 30
    pull-down menus 29
    selection methods 31–33
  SAS graphs
    buffer pools 103
    CTC 173
    NCP 173
    response time 198
    virtual route 138
  saving
    snapshot 66
    trace 210
  scope, monitoring VRs 317
  scroll function keys 27
  search traces 205
  secondary LU 284
  selecting a buffer pool 98
  selection methods 31–33
    action codes 33
    fastpath 32
  service-level reports, SAS 198
  session
    active 286
    applications analysis 292
    control 208
    distribution trends 136
    monitoring 183
    partners 208
    pending 286
    response time 194
    RPL 294
    SIB 293
  setting
    global defaults 310
    thresholds 310
  SF00 buffer pool 94
SIB control block 293
SIOs per second 232, 239, 240
SLODN TNSTAT 146, 165
SLOWPT parameter 94, 102, 111, 112
SLU
See secondary LU
small fixed storage pool
See SF00 buffer pool
small pageable storage buffer pool
See SP00 buffer pool
SMF
adding a resource 324
record number 313
SNA
categories for trace 208
controllers
how VTAM reads data 164
NCP and local 164
SNAP command 48
snapshot
annotating 66
deleting 65
directory 64, 67
displaying 64
duplicate 66
finding 64
locating 69
panels 66
printing 65
retrieving 64
saving 63, 66
viewing 68
sorting
data in display 45
subgroup of data 46
SP00 buffer pool 94
SRB mode 241
exits 301
SRM
See System Resources Manager
SRT
directory sizes 263
frequency distribution 250
information 247
modeling facility 247
SSCPNAME parameter 233
start
response time monitoring 191
response time monitoring at logon 193
TCP/IP monitoring 272
trace 209
start I/Os 240
start options
buffer pool 99, 111, 113
startup parameter list 234
state
applid 288
virtual route 121
static allocation 92–93
statistics
internal traces 242, 243
status bar options 41
status display
See main status
status light 53–54
color 53
determination 311
response time 187
text customization 41
trace facility 203
tuning statistics 143
virtual route 123
VTAM trace 53
status, applid 288
status, response time recording 324
STC job type 287
step name 287
stopping
response time monitoring 193
TCP/IP monitoring 272
trace 210
storage
CSA performance 235
efficiency 25
private 288, 302
resume address 260
wasted 101
subarea
adjacent 148
destination 118
maximum number 264
node 118
response time 196–199
subchannel monitoring, MPC 148
Symbol Resolution Table
See SRT
symbols, use of 18
synchronizing profiles 186, 339, 364
System Network Architecture
See SNA
trace facility (continued)
  TH data 217
  transmission header 218
  usage 202
TRACERTE command 275, 279
tracking, CSA 268
traffic trends 135
transmission header
  See TH data
Transmission Subsystem Control Block 96
TRC authority 340
trends
  applications 277
  buffer pool 109
    navigation, CRPL 115
    TCP/IP 273
  connection 275
  CTC 156
    TNSTATs navigation 163
data 58
  display setting 313
displays 58
  fastpathing 180
  file utilization 330
  local 177
    TNSTATs navigation 179
  MPC 158
  NCP TNSTATs 169
    navigation 172
  TCP/IP 272
times buffer pool expanded 109
virtual route 132–136
  message traffic 135
  navigation 140
  session distribution 136
  status 132
  window size 134
TSCB
  See Transmission Subsystem Control Block
tuning objectives 142
tuning statistics (continued)
  status lights 143
  tuning to increase coattailing 144
  tuning the network 25–26
tutorial for CUA 36
types
  resource analysis 78
  user authorities 340
U
user authorities 337–345
  adding a user authorization 341
  changing a user authorization 343
  $DEFAULT settings 339
  deleting a user authorization 344
  establishing the first administrator 339
  navigation chart 345
  options 340–345
  restrictions 338
  startup 339
types 340
user commands 73
user defaults 38
user exits 245–246
user interface 26–42
  customization 38–42
    autorefresh 40
    Netmaster access 43
    NetView access 43
    status bar options 41
    terminal beep option 41
    terminal options 39
USERS command 48
USSTAB table 296
utilization, TCP/IP 271
V
vary logon logmode 302
versions supported, VTAM and NCP 26
VIEW command 48
View facility 45–47
viewing
  snapshot 68
  some of the display 46
virtual route 117–140
  active 121
  analysis panel 122
virtual route (continued)
  blocked 121
  blocked virtual route case study 137
  explicit route 118
  held 121
  historical reports, SAS 138
  hops 131
  LU-LU session trends 136
  monitor list 319
  monitor options 317–319
  navigation chart 139
  number 118
  obtaining 122
  open 121
  pacing 119–120
  pacing request 119
  pacing response 119
  pacing window size 134
  response time 129, 196–199
  session distribution trends 136
  setting thresholds 317–321
  status 121
  status light 123
  trending navigation 140
  trends 132–136
    message traffic 135
    PIU traffic 135
    session distribution 136
    status 132
    traffic 135
  tuning 118, 126–130
  window size 127
  trends 134

virtual terminal pool prefix 313

VIT
  characteristics 243
  data 244
  statistics 242–243
  wraps 243

VRPRQ 119
VRPRS 119

VSAM log files 330

VTAM
  command 48
  console 57
  current release level 233
  job name 231
  lock analysis 251–261
  page-ins 238
  resource analysis 79
  trace
  See trace facility

VTAM (continued)
  versions supported 26
  VTAM environment 229–266
    CPU utilization 241
    CSA performance 235
    data display 233
    internal trace data 244
    internal trace statistics 242
    lock analysis feature 251
    navigation chart 266
    performance summary 231
    setting thresholds 321
  SRT
    analysis 248
    frequency distribution 250
    modeling facility 247
  user exits 245

VTAMLST dataset
  APPC capable 302
  application definition 301
  authorized functions 302
  CDRM 233
  CSA and C24 limits 235
  DELAY parameter 147
  DLOGMOD 301
  EAS value 301
  exits in SRB mode 301
  major node 301
  MAX private 302
  modetab 301
  NETID 233
  network name 233
  parallel sessions 302
  path definition 118
  SSCPNAME 233
  vary logon logmode 302
  VTAM FRR coverage 302

W

  waiting for VTAM locks 254
  warning thresholds
    performance objectives 310
    response time 190
  wasted storage 101
  window
    pacing 119–120
    size 119–120, 127
    maximum 127
    minimum 127
    trends 134
working set size 237–238
WP00 buffer pool 94
write channel programs initiated (CHWR) 165

X

XD00 buffer pool 94
XPANLIM parameter 95
XPANNO parameter 95, 101, 102, 111, 112
XPANPT parameter (expansion point) 95

Z

zoom
  access from OMEGAVIEW to
    OMEGAMON II 360
  alternate destinations 363
  customized panels 364
  default destinations 362
  graphic overview 360
  references 365
  to exceptions 363
  to main status 363