



IBM Multi-site Workload Lifeline V2.0 User's Guide

Version 2 Release 0

Note:

Before using this information and the product it supports, be sure to read the general information under “Notices” on page 195.

First Edition (October 2013)

This edition applies to Version 2 Release 0 of IBM Multi-site Workload Lifeline (5655-UM4).

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About this document

This document describes how to use IBM Multi-site Workload Lifeline to load balance TCP/IP workload requests across two sites at unlimited distances when both sites run the same server applications and have the same data sources.

Who should read this document

This document is written for system administrators who need to understand how to load balance TCP/IP workload requests.

How this document is organized

This document contains the following information:

- "Chapter 1. Overview of Multi-site Workload Lifeline" introduces the concept of Lifeline Advisors, Lifeline Agents, external load balancers, and internal load balancers.
- "Chapter 2. Preparing to use Multi-site Workload Lifeline" contains the information about the tasks that you need to complete before you can configure Multi-site Workload Lifeline.
- "Chapter 3. Configuring Multi-site Workload Lifeline" contains the information about the tasks to configure Multi-site Workload Lifeline.
- "Chapter 4. Starting the Lifeline Advisors and Agents" contains the information about how to start the Lifeline Advisors and Agents that make up Multi-site Workload Lifeline.
- "Chapter 5. Diagnosing problems in Multi-site Workload Lifeline" contains the information that you need to diagnose problems.
- "Chapter 6. Multi-site Workload Lifeline configuration statements" describes the configuration statements of the Lifeline Advisors and Agents.
- "Chapter 7. Lifeline Advisor commands" describes the commands that you can use to display Lifeline Advisor information and modify Lifeline Advisor state information.
- "Chapter 8. Lifeline Agent commands" describes the commands that you can use to display Lifeline Agent information and modify Lifeline Advisor state information.
- "Chapter 9. Network Management Interface for Multi-site Workload Lifeline" describes the Network Management Interface (NMI) that you can use to monitor Lifeline metrics and statistics.
- "Chapter 10. Multi-site Workload Lifeline messages" contains the Multi-site Workload Lifeline messages.
- "Accessibility" describes accessibility features to help users with physical disabilities.
- "Notices" contains notices and trademarks used in this document.

How to use this document

To use this document, you should be familiar with z/OS TCP/IP Services and the TCP/IP suite of protocols.

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- At the end of a publication's order number there is a dash followed by two digits, often referred to as the dash level. A publication with a higher dash level is more current than one with a lower dash level. For example, in the publication order number GC28-1747-07, the dash level 07 means that the publication is more current than previous levels, such as 05 or 04.
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- To compare softcopy publications, you can check the last two characters of the publication's file name (also called the book name). The higher the number, the more recent the publication. Also, next to the publication titles in the CD-ROM booklet and the readme files, there is an asterisk (*) that indicates whether a publication is new or changed.

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If you would like to provide feedback on this publication, see “Communicating your comments to IBM” on page 203.

Conventions and terminology that are used in this document

Samples used in this book might not be updated for each release. Evaluate a sample carefully before applying it to your system.

For definitions of the terms and abbreviations that are used in this document, you can view the latest IBM terminology at the IBM Terminology Web site.

Qualifying elements

Notes

Information traditionally qualified as **Notes** is further qualified as follows:

Note Supplemental detail

Tip Offers shortcuts or alternative ways of performing an action; a hint

Guideline

Customary way to perform a procedure

Rule Something you must do; limitations on your actions

Restriction

Indicates certain conditions are not supported; limitations on a product or facility

Requirement

Dependencies, prerequisites

Result Indicates the outcome

How to read a syntax diagram

This syntax information applies to all commands and statements that do not have their own syntax described elsewhere.

The syntax diagram shows you how to specify a command so that the operating system can correctly interpret what you type. Read the syntax diagram from left to right and from top to bottom, following the horizontal line (the main path).

Symbols and punctuation

The following symbols are used in syntax diagrams:

Symbol

Description

- ▶▶ Marks the beginning of the command syntax.
- ▶ Indicates that the command syntax is continued.
- | Marks the beginning and end of a fragment or part of the command syntax.
- ◀◀ Marks the end of the command syntax.

You must include all punctuation such as colons, semicolons, commas, quotation marks, and minus signs that are shown in the syntax diagram.

Parameters

The following types of parameters are used in syntax diagrams.

Required

Required parameters are displayed on the main path.

Optional

Optional parameters are displayed below the main path.

Default

Default parameters are displayed above the main path.

Parameters are classified as keywords or variables. For MVS™ console commands, the keywords are not case sensitive. You can code them in uppercase or lowercase. If the keyword appears in the syntax diagram in both uppercase and lowercase, the uppercase portion is the abbreviation for the keyword (for example, OPERand).

For the z/OS® UNIX commands, the keywords must be entered in the case indicated in the syntax diagram.

Variables are italicized, appear in lowercase letters, and represent names or values you supply. For example, a data set is a variable.

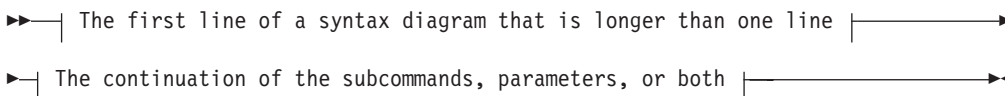
Syntax examples

In the following example, the USER command is a keyword. The required variable parameter is *user_id*, and the optional variable parameter is *password*. Replace the variable parameters with your own values.



Longer than one line

If a diagram is longer than one line, the first line ends with a single arrowhead and the second line begins with a single arrowhead.



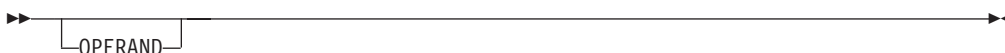
Required operands

Required operands and values appear on the main path line. You must code required operands and values.



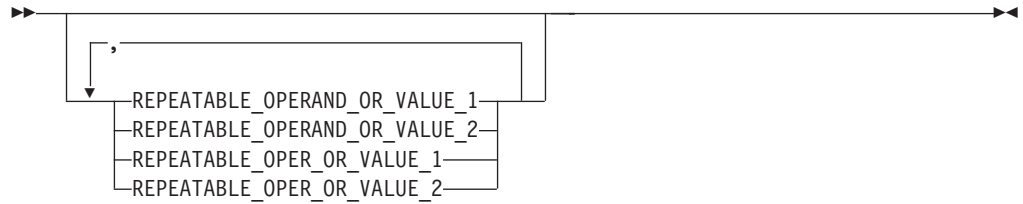
Optional values

Optional operands and values appear below the main path line. You do not have to code optional operands and values.



Selecting more than one operand

An arrow returning to the left above a group of operands or values means more than one can be selected, or a single one can be repeated.



Nonalphanumeric characters

If a diagram shows a character that is not alphanumeric (such as parentheses, periods, commas, and equal signs), you must code the character as part of the syntax. In this example, you must code OPERAND=(001,0.001).



Blank spaces in syntax diagrams

If a diagram shows a blank space, you must code the blank space as part of the syntax. In this example, you must code OPERAND=(001 FIXED).



Default operands

Default operands and values appear above the main path line. Multi-site Workload Lifeline uses the default if you omit the operand entirely.



Variables

A word in all lowercase italics is a *variable*. Where you see a variable in the syntax, you must replace it with one of its allowable names or values, as defined in the text.



Syntax fragments

Some diagrams contain syntax fragments, which serve to break up diagrams that are too long, too complex, or too repetitious. Syntax fragment names are in mixed case and are shown in the diagram and in the heading of the fragment. The fragment is placed below the main diagram.



Syntax fragment:

|—1ST_OPERAND—,—2ND_OPERAND—,—3RD_OPERAND—|

How to send your comments

Your feedback is important in helping to provide the most accurate and high-quality information. If you have any comments about this document or any other z/OS Communications Server documentation, do one of the following:

- Go to the z/OS contact page at <http://www.ibm.com/systems/z/os/zos/webqs.html>. You can enter and submit your comments in the form provided at this Web site.
- Send your comments by e-mail to comsvrcf@us.ibm.com. Be sure to include the name of the document, the part number of the document, the version of z/OS Communications Server, and, if applicable, the specific location of the text that you are commenting on (for example, a section number, a page number or a table number).

Summary of changes

Changes made in IBM Multi-site Workload Lifeline Version 2 Release 0

This document contains information previously presented in SC23-8600-03, which supports IBM Multi-site Workload Lifeline Version 1 Release 1. This document contains minor maintenance updates and updates pertaining to Active/Query workload support.

New Information

- “Authorizing the Lifeline Advisor to accept secure peer Advisor connections” on page 13, “Authorizing the Lifeline Advisor to accept secure Agent connections” on page 13, and “Authorizing the Lifeline Advisor to accept secure Load Balancer connections” on page 14 have been added.
- “Migrating IBM Multi-site Workload Lifeline” on page 24, “Migrating the Lifeline Advisor” on page 24, and “Migrating the Lifeline Agent” on page 25 have been added.
- Messages “AQS0007I” on page 114, “AQS0008I” on page 115, “AQS0106I” on page 118 have been added.
- Messages “AQS0200I” on page 158 through “AQS0206I” on page 161 have been added.
- Messages “AQS0300I” on page 162 through “AQS0318W” on page 173 have been added.

Changed information

- Chapter 1, “Overview of Multi-site Workload Lifeline,” on page 1 has been updated.
- “Granting users explicit authority to control the Lifeline Advisor and Agent” on page 11 has been updated.
- Chapter 3, “Configuring Multi-site Workload Lifeline,” on page 17 has been updated.
- “Diagnosing problems when a workload is not distributed” on page 40 and “Diagnosing workload distribution problems” on page 42 have been updated.
- Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 has been updated.
- Chapter 7, “Lifeline Advisor commands,” on page 69 has been updated.
- Chapter 9, “Network Management Interface for Multi-site Workload Lifeline,” on page 105 has been updated.
- The following messages have been updated:
 - Message “AQS0105I” on page 117 has been updated.
 - Message “AQS0124I” on page 126 has been updated.
 - Message “AQS0127W” on page 128 has been updated.
 - Messages “AQS0135W” on page 132 through “AQS0137I” on page 133 have been updated.
 - Message “AQS0153I” on page 137 has been updated.
 - Message “AQS0156I” on page 139 has been updated.

- Messages “AQS0158I” on page 140 and “AQS0159I” on page 140 have been updated.
- Message “AQS0162I” on page 141 has been updated.
- Message “AQS0164W” on page 143 has been updated.
- Messages “AQS0166I” on page 144 through “AQS0168I” on page 145 have been updated.
- Messages “AQS0173I” on page 148 through “AQS0178I” on page 151 have been updated.
- Message “AQS0180W” on page 152 has been updated.
- Message “AQS0182I” on page 153 has been updated.
- Message “AQS0185I” on page 154 has been updated.
- Message “AQS0188W” on page 156 has been updated.
- Message “AQS0189W” on page 156 has been updated.
- Message “AQS0191I” on page 157 has been updated.
- Appendix C, “Sample configuration statements,” on page 179 has been updated.

Removed information

The following messages have been removed:

- AQS0152I has been removed.
- AQS0154I has been removed.

Changes made in IBM Multi-site Workload Lifeline Version 1 Release 1

This document contains information previously presented in SC23-8600-01, which supports IBM Multi-site Workload Lifeline Version 1 Release 1. This document contains minor maintenance updates.

New Information

- “Intermediary nodes” on page 10 has been added.
- Lifeline Advisor configuration statement “intermediary_node_list” on page 55 has been added.
- Message “AQS0190I” on page 157 has been added.
- Sample configuration statement “Multi-site Workload Lifeline configuration Example 2” on page 183 has been added.

Changed information

- Chapter 1, “Overview of Multi-site Workload Lifeline,” on page 1 has been updated.
- Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 has been updated.
- “Lifeline Advisor configuration statements” on page 47 has been updated.
- “agent_id_list” on page 51 has been updated.
- Message “AQS0158I” on page 140 has been updated.
- Message “AQS0159I” on page 140 has been updated.
- Message “AQS0166I” on page 144 has been updated.
- Appendix C, “Sample configuration statements,” on page 179 has been updated.

Changes made in IBM Multi-site Workload Lifeline Version 1 Release 1

This document contains information previously presented in SC23-8600-00, which supports IBM Multi-site Workload Lifeline Version 1 Release 1. This document contains minor maintenance updates.

New Information

- Lifeline Advisor configuration statement “peer_advisor_id” on page 59 has been added.
- Lifeline Advisor configuration statement “advisor_id_list” on page 65 has been added.
- Message “AQS0190I” on page 157 has been added.
- Message “AQS0191I” on page 157 has been added.

Changed information

- “External load balancers” on page 8 has been updated.
- “Granting users explicit authority to control the Lifeline Advisor and Agent” on page 11 has been updated.
- “Configuring Lifeline Agents to automatically restart” on page 23 has been updated.
- “cross_sysplex_list” on page 52 has been updated.
- “advisor_id” on page 64 has been updated.
- Message “AQS0006I” on page 114 has been updated.
- Message “AQS0116I” on page 122 has been updated.
- Message “AQS0125I” on page 127 has been updated.
- Message “AQS0147I” on page 137 has been updated.
- Message “AQS0168I” on page 145 has been updated.

Chapter 1. Overview of Multi-site Workload Lifeline

Multi-site Workload Lifeline provides the ability to load balance TCP/IP workload requests across two sites at unlimited distances, when both sites are running the same server applications and have the same data sources. Multi-site Workload Lifeline defines two tiers of load balancing.

A workload consists of one or more groups of applications that access the same data sources to provide related services for a client. All server applications in a load balancer application group provide the same service for that client. Each server application within an application group can provide the same services as the other applications in the group. You can group server applications that access different data sources into their own workload to provide more granular control of each group of applications.

A first-tier load balancer registers application groups that contain members that are in both sites. These members are considered second-tier load balancers. These members can be external load balancers, sysplex distributor distributed DVIPAs, or intermediary nodes. When the first-tier load balancer distributes connections for an Active/Standby workload, it distributes work only to the second-tier load balancers in one active site. When the first-tier load balancer distributes connections for an Active/Query workload, it distributes work to the second-tier load balancers in the active or both active sites.

An external load balancer, operating as a second-tier load balancer, registers groups of server applications that are on the same site. As this external load balancer receives a workload connection request from a first-tier load balancer, the external load balancer distributes the request to one of the server applications in the matching application group.

Multi-site Workload Lifeline consists of Lifeline Advisors and Lifeline Agents. The primary Lifeline Advisor communicates with external load balancers, one or more Lifeline Agents, and possibly a secondary Lifeline Advisor. Lifeline Advisor uses the Server/Application State Protocol (SASP) to communicate with external load balancers.

Each workload that is configured to Multi-site Workload Lifeline is classified as an Active/Standby or Active/Query workload. By definition, an Active/Standby workload can be distributed to only one site at a time, because the workload might contain transactions that update databases. By contrast, an Active/Query workload can be distributed to both sites at the same time, because the workload contains only transactions that query databases. Multi-site Workload Lifeline enforces the single or dual site distribution. If more than one workload is configured, some of the workloads can be distributed to one site, some workloads can be distributed to the other site, and the remaining workloads can be distributed to both sites.

A workload is unavailable on a site if its application group is unavailable. A group is considered unavailable if all of its server applications are unavailable. A server application is considered unavailable if any of the following conditions is true:

- The server application is not active.
- The server application is active but not fully operational.
- The system on which the server application runs is resource constrained.

When a single workload defines multiple application groups for an Active/Standby workload, the services that each group provides depend on each other. As a result, if one of the groups is unavailable on that site, the workload is not available on that site. For an Active/Query workload, only a single application group can be defined.

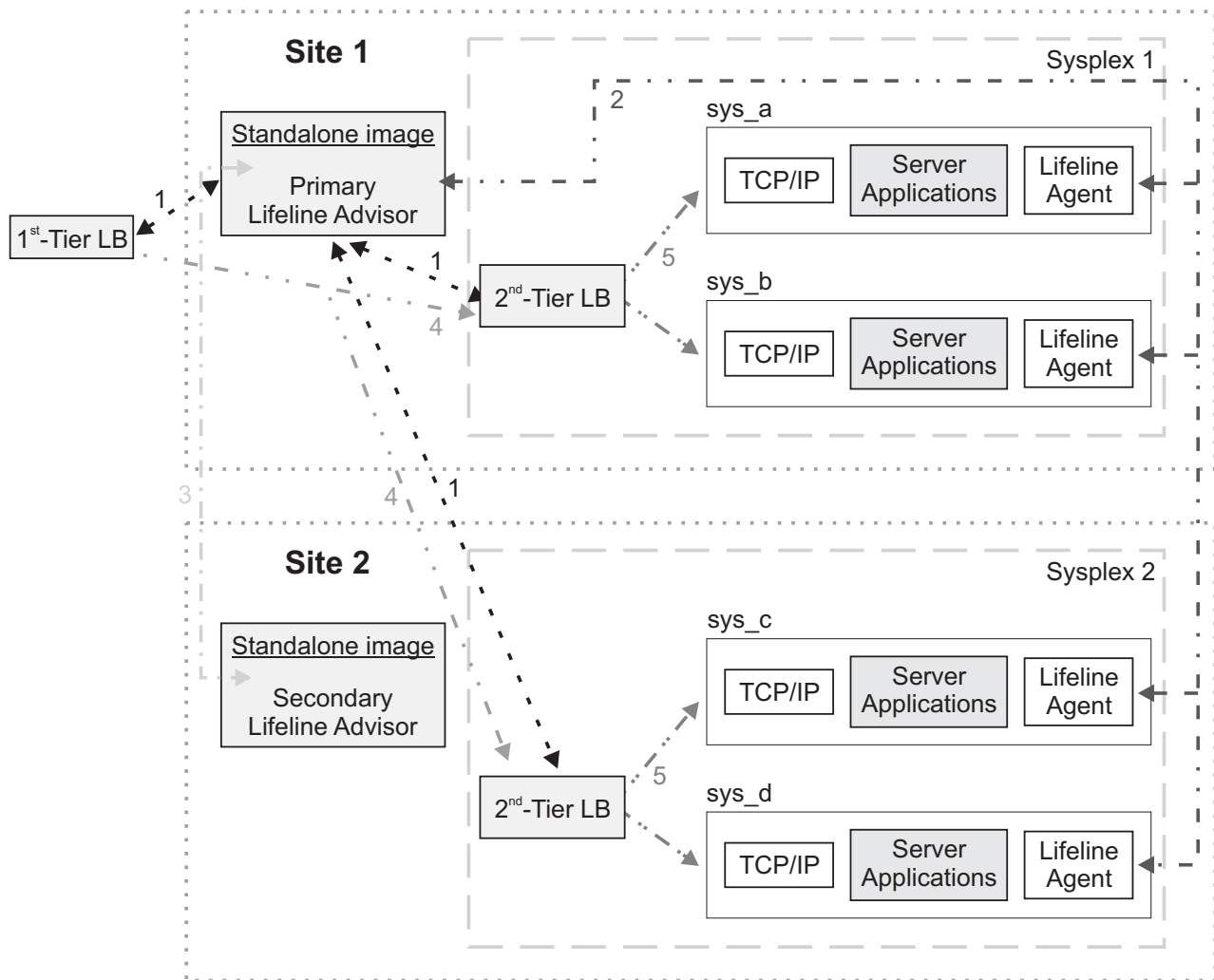
For an Active/Standby workload, a workload failure occurs if at least one of the groups on the site where the workload is active has been continuously unavailable for the failure detection interval configured for the workload.

For an Active/Query workload, a workload failure occurs if its group on the sites where the workload is active has been continuously unavailable for the failure detection interval that is configured for the workload.

Rule: In this information, the word *site* is interchangeable with *sysplex*. All z/OS target systems in a particular site must belong to the same sysplex.

In a typical configuration, the first-tier load balancer determines which site to route a new workload request to and forwards the request to a second-tier load balancer. The second-tier load balancer determines which server application within the site to route the workload request to and forwards it to the z/OS system where the server application is running. Multi-site Workload Lifeline provides the different tiers with routing recommendations based on the availability and health of the server applications and the z/OS systems within the site.

Multi-Site Workload Lifeline



- | | |
|--|--|
| <p>1. Lifeline Advisor 1st and 2nd tier load balancers SASP flows</p> <p>2. Lifeline Advisor to Lifeline Agents communication</p> <p>3. Primary to Secondary Lifeline Advisor state exchange</p> | <p>4. 1st to 2nd tier connection load balancing</p> <p>5. 2nd tier to server instance connection load balancing</p> |
|--|--|

Figure 1. Relationships between external load balancers, Lifeline Advisors, and Lifeline Agents

In Figure 1, the Lifeline Agents running on each z/OS system in the two sites, Sysplex1 and Sysplex2, monitor the health of the server applications and the system where the Agent is active. The Lifeline Agents periodically send this information to the primary Lifeline Advisor, indicated by the network flows labeled **2**. The primary Lifeline Advisor uses this information to calculate routing recommendations for the workloads that use these server applications. The Lifeline Advisor periodically sends recommendations to first-tier load balancers about which site to route workload requests to and recommendations to second-tier load balancers about which server application within a site to route the workload requests to, indicated by the network flows labeled **1**.

The primary Lifeline Advisor also periodically notifies the secondary Lifeline Advisor about any changes in the workload states, indicated by the network flows labeled **3**, so that the secondary Advisor can take over primary Advisor responsibilities if the current primary Advisor becomes not-operational.

When workload requests are handled by the first-tier load balancers, based on routing recommendations from the Lifeline Advisor, the load balancer selects a site and forwards the request to the second-tier load balancer in that site, indicated by the network flows labeled **4**. When workload requests are handled by the second-tier load balancers, based on routing recommendations from the Lifeline Advisor, the load balancer selects a server application in the site and forwards it to the TCP/IP stack running on the z/OS system, indicated by the network flows labeled **5**. When these second-tier load balancers are external, they receive routing recommendations directly from the Lifeline Advisor. When these second-tier load balancers are internal, also known as z/OS sysplex distributors, they reside on a z/OS system in the site, and receive routing recommendations directly by using z/OS Communications Server functions. For more information about the z/OS sysplex distributor, see *z/OS Communications Server: IP Configuration Guide*.

In another configuration, the second-tier load balancer is not responsible for routing workload requests to a server application within a site. In this case, load balancing within a site will not be accomplished by using a second-tier load balancer such as the z/OS sysplex distributor. Instead, it will be performed by some other node, which is called an intermediary node.

In Figure 2 on page 5, static VIPA addresses might be the preferable method to reach target server applications rather than distributable dynamic VIPAs. These static VIPAs are considered the intermediary node. The first-tier load balancer will distribute workload requests directly to the intermediary node (that is, to server applications using static VIPAs) rather than a second-tier load balancer.

In Figure 3 on page 6, a customized load balancing solution that does not communicate with the Lifeline Advisor might be the preferable method to reach target server applications rather than distributable dynamic VIPAs. These load balancers are considered the intermediary node. The first-tier load balancer will distribute workload requests directly to the intermediary node (that is, to the customized load balancing solution) rather than a second-tier load balancer. The intermediary node will then distribute workload requests to the server applications within the site.

In both cases, the z/OS sysplex distributor is configured as a second-tier load balancer, though it will not distribute workload requests. The z/OS sysplex distributor is used to dynamically determine the set of server applications for each workload, thus these server application instances can be monitored. Multi-site Workload Lifeline provides routing recommendations only to the first-tier load balancer.

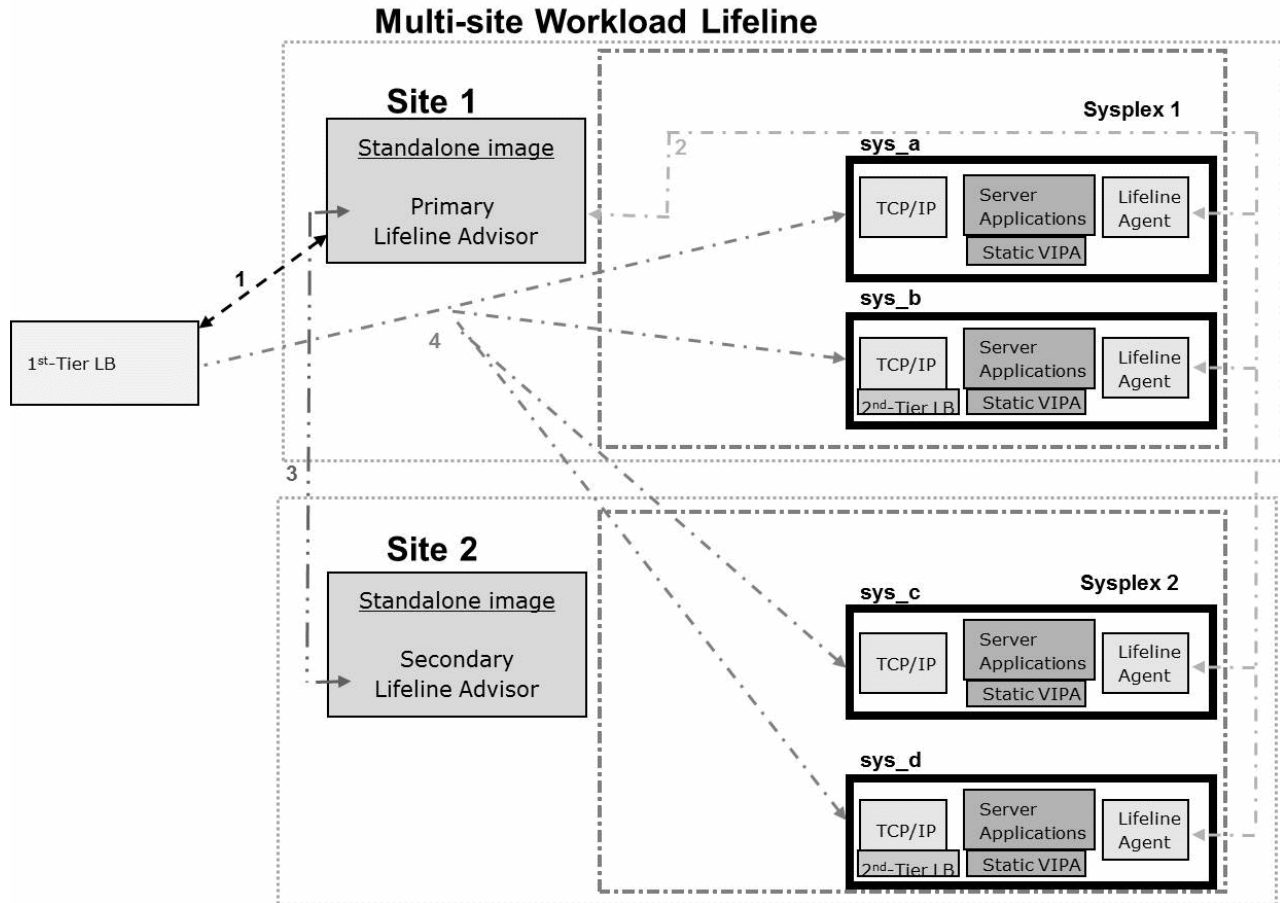


Figure 2. Relationships between external load balancers, internal intermediary nodes, Lifeline Advisors, and Lifeline Agents

In Figure 2, the Lifeline Agents, Lifeline Advisors, and first-tier load balancers communicate as is shown in Figure 1 on page 3. However, when a first-tier load balancer handles workload requests based on routing recommendations from the Lifeline Advisor, the load balancer selects a site and forwards the request directly to the intermediary node as indicated by the network flows labeled **4**. In this case, the intermediary node is the TCP/IP stack running on the z/OS system that owns the static VIPA. No second-tier load balancers distribute workload requests within the site. However, these second-tier load balancers that are configured as z/OS sysplex distributors are used to monitor the server applications for the workload.

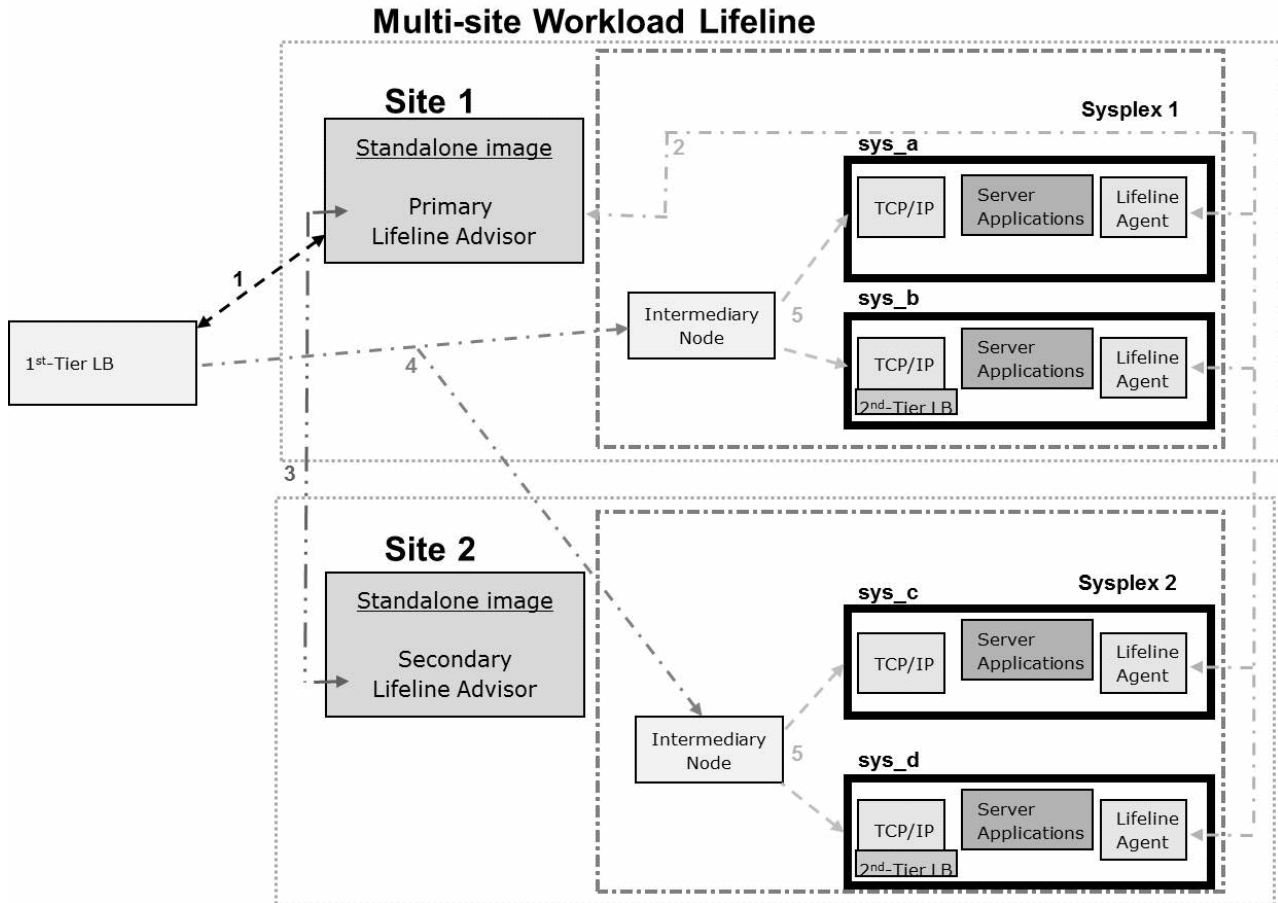


Figure 3. Relationships between external load balancers, external intermediary nodes, Lifeline Advisors, and Lifeline Agents

In Figure 3, the Lifeline Agents, Lifeline Advisors, and first-tier load balancers communicate as is shown in Figure 1 on page 3. However, when a first-tier load balancer handles workload requests based on routing recommendations from the Lifeline Advisor, the load balancer selects a site and forwards the requests directly to the intermediary node as indicated by the network flows labeled **4**. In this case, the intermediary node is the customized load balancing solution within that site. When the intermediary node handles workload requests, the intermediary node selects a server application in the site and forwards it to the TCP/IP stack that is running on the z/OS system, as indicated by the network flows labeled **5**. No second-tier load balancers distribute workload requests within the site. However, these second-tier load balancers that are configured as z/OS sysplex distributors are used to monitor the server applications for the workload.

Lifeline Advisors

The primary Lifeline Advisor provides recommendations that are used by a first-tier external load balancer to determine how to route new requests to a second-tier load balancer to select a target site. The second-tier load balancer then routes each request to a target z/OS system in the site to select a target application.

Rule: In this information, whenever the term Lifeline Advisor or Advisor is mentioned, it is referring to the primary Lifeline Advisor. Any references to the secondary Lifeline Advisor is indicated by the terminology secondary Lifeline Advisor or secondary Advisor.

The second-tier load balancer can be either another external load balancer or a z/OS sysplex distributor on a specific z/OS system in the site. If the second-tier load balancer is an external load balancer, it also uses the Lifeline Advisor recommendations to determine how to route these new requests to the target applications in the z/OS site. If the second-tier load balancer is a z/OS sysplex distributor, it creates its own recommendations that are similar to the ones that the Lifeline Advisor creates to determine how to route these new requests to the target applications in the z/OS site.

The Lifeline Advisor maintains at least two, and up to four, listening sockets or ports; one is for the Lifeline Agents to connect to, up to two are for the external load balancers to connect to, and optionally one is for the secondary Lifeline Advisor to connect to. There are separate IPv4 and IPv6 listening sockets for external load balancers. If your TCP/IP stack is not IPv6 enabled, you will not be able to use the IPv6 listening socket.

The Lifeline Advisor maintains an access control list that allows external load balancers, the secondary Lifeline Advisor, and the Lifeline Agents to connect to it. The access control list specifies the remote IP address of the connecting external load balancers, the remote IP address and port of the secondary Lifeline Advisor, and the Lifeline Agents that are allowed to connect to the Lifeline Advisor.

Recommendations provided by the Lifeline Advisor

The recommendations provided by the Lifeline Advisor are dynamic, and can change as the conditions of the target sites, systems, and server applications change. The recommendations include the following information:

- An indication of whether the target server application, the target system, or the target site is currently active. The Advisor uses this information to exclude systems or sites that are not active or do not have the required server applications running.
- z/OS Workload Management (WLM) server-specific recommendations. WLM recommendations provide a relative measure of the ability of a target system to handle new workload, as compared to other target systems across both sites. They also provide a measure of the performance of individual server applications, as compared to the WLM policy goals specified for that workload. The WLM recommendations are derived from the following metrics that are based on the importance of the workload, as defined by the WLM policy:
 - Displaceable general CPU capacity of each system
 - System z[®] Application Assist Processor (zAAP) capacity
 - System z Integrated Information Processor (zIIP) capacity
 - The proportion of each type of CPU that the server application is using
- An indication of server application health from a TCP/IP perspective. TCP/IP statistics for target applications are monitored to determine whether specific server applications are encountering problems that prevent the applications from keeping up with the current workload. For example, is a target TCP server application keeping up with TCP connection requests? Are requests being rejected because the backlog queue is full? In such scenarios, the recommendations passed back to the external load balancers are adjusted

appropriately, so that the load balancer can direct fewer connections to any server application that is experiencing these problems. These recommendations are provided for TCP server applications and are referred to as Communications Server weights in this information.

Lifeline Agents

The Lifeline Agent receives from the Lifeline Advisor a list of server applications that are configured to receive workload requests from registered external load balancers. The Lifeline Agent gathers data about these server applications and returns the information to the Advisor.

The Lifeline Agent maintains a single connection to the Lifeline Advisor to communicate status information. This can be either an IPv4 or IPv6 connection. If the TCP/IP stack where the Agent resides is not IPv6-enabled, you will not be able to create the IPv6 connection.

See the Recommendations provided by the Lifeline Advisor section in “Lifeline Advisors” on page 6 for the set of metrics gather by the Agents about the server applications and z/OS system being monitored.

External load balancers

External load balancers use Server/Application State Protocol (SASP) to obtain recommendations and topology information related to server applications and systems in a clustered environment.

Rule: First-tier load balancers must be external load balancers that are SASP-enabled.

A second-tier load balancer can be an external load balancer that is SASP-enabled or a z/OS sysplex distributor on a z/OS system in the site.

External load balancers can obtain detailed information regarding the state of target z/OS applications and systems by communicating with the Lifeline Advisor using the SASP protocol. External load balancers use SASP to do the following things:

- Obtain detailed recommendations about how to distribute workload requests between the two sites, based on the current configuration and workload conditions.
- Obtain detailed recommendations about how to distribute workload requests in the site, based on the current configuration and workload conditions.
- Perform workload load balancing that is optimized for your two sites.

In some configurations, multiple server applications may be listening on the same port. When the TCP connection requests reach a target TCP/IP stack for these server applications sharing the same port, the connections are load balanced by TCP/IP across the multiple server application instances. How this load balancing is performed depends on whether the SHAREPORT or SHAREPORTWLM parameter is specified on the PORT statement. For more details about the PORT statement, see *z/OS Communications Server: IP Configuration Reference*. When you use Multi-site Workload Lifeline, all instances of this server application that share the same port on a target system are reported to external load balancers through a single member entry.

You might be able to customize the features of the way that the external load balancer communicates with the Lifeline Advisor. The SASP protocol defines two features of the external load balancer implementation that you might be able to configure:

- Whether the external load balancer polls the Lifeline Advisor for updated data or whether the updated data is pushed to the external load balancer.
- Whether only members that have updated data should be sent to the external load balancer or whether all members should be sent to the load balancer, regardless of whether their data has changed.

If you configure the external load balancer to request that the Lifeline Advisor push the updated information to the load balancer, the Lifeline Advisor updates the load balancer at least once every update interval. If you configure the external load balancer to poll the Lifeline Advisor for updated information, the Lifeline Advisor passes a recommended polling interval to the load balancer. However, you can configure the external load balancer to disregard this guideline.

External load balancers typically use a cluster IP address to represent the server applications that are being load balanced. Client applications use this cluster IP address as the destination IP address for their requests.

In addition, some external load balancers might be able to use either directed or dispatch mode when they forward packets to their destinations.

Directed mode

When an external load balancer uses directed mode to forward packets to their destinations, it can use NAT to convert the destination IP address (the cluster IP address) to an IP address owned by the target z/OS system. When IP packets for these connections are sent back to clients, the external load balancer converts the source IP address (the IP address of the target z/OS system) back to the cluster IP address that the application used on its request. The load balancer either modifies the destination IP address (server NAT) in the packet itself or modifies both the destination and source IP addresses (server NAT and client NAT) in the packet. The packet must return through the same external load balancer, which recognizes the changes and does the reverse mapping. Then a packet can flow from the original destination to the original source.

Rule: Always configure first-tier load balancers to use directed mode. These load balancers route requests only to second-tier load balancers.

Guideline: You can configure external second-tier load balancers to use either directed or dispatch mode, although directed mode is recommended to avoid having to make server application changes.

Dispatch mode

When an external load balancer uses dispatch mode to forward packets to their destinations, the destination IP addresses for incoming IP packets are not changed. Instead, the external load balancer forwards the packet to a target z/OS system by using the MAC address of a network adapter on that system. The receiving z/OS system inspects the destination IP address of the packet, and accepts the packet if the IP address matches one of the IP addresses in its HOME list. As a result, with dispatch mode, all target z/OS systems must have the external load balancer's cluster IP address defined in their HOME list. However, these addresses must not

be advertised externally through dynamic routing protocols. To prevent the addresses from being advertised externally through dynamic routing protocols, define these IP addresses as loopback addresses on z/OS.

Dispatch mode eliminates the need to perform network address translation (NAT). Dispatch mode has the following restrictions, which ensure that the second-tier external load balancer functions correctly:

Restrictions:

- An OSA device can be shared among logical partitions (LPARs) only if virtual MAC (VMAC) addressing is configured for each TCP/IP target stack that shares the OSA device.
- All target applications must bind to the IP address specified by INADDR_ANY or IN6ADDR_ANY, and the cluster IP address of the 2nd-tier load balancer must be defined to the stack. To ensure that this cluster IP address is not advertised, define it as a loopback address.
- First-tier load balancers cannot be configured in dispatch mode.

If you do not meet the previous restrictions, load balancing will not be optimal because work will not be routed to some servers.

Internal load balancers

An internal load balancer, also known as z/OS sysplex distributor, resides on a z/OS system in the site. It uses z/OS Communications Server functions to obtain recommendations and topology information related to server applications in a sysplex environment.

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

Tip: You can use z/OS sysplex distributor to perform the second-tier load balancing function.

Intermediary nodes

An intermediary node does not communicate directly with the Lifeline Advisor, but it replaces the function of a second-tier load balancer. It is used in cases where customized load balancing has been built into a workload. In this type of configuration, the z/OS sysplex distributor must still be defined, but it is used only for obtaining recommendations and topology information that the first-tier load balancer uses to select the site for a workload connection request. The intermediary node makes the load balancing decision to select a server application instance within the site.

Chapter 2. Preparing to use Multi-site Workload Lifeline

You need to evaluate TCP/IP workloads and grant users authority before you can configure Multi-site Workload Lifeline to balance TCP/IP workloads between the two z/OS sites.

Before you begin

You must meet the following requirements:

- All z/OS systems must be at least at the V1R12 level.
- You must have at least one first-tier external load balancer that supports the Server/Application State Protocol (SASP). The load balancer must have IP connectivity to each second-tier load balancer. The second-tier load balancer is either another external load balancer that supports SASP or a z/OS sysplex distributor running on a target system in the site.
- The TCP/IP applications that are identified to be load balanced must be able to run on target systems that are in different sites, and must be able to access data sources that are synchronized across the sites.

Granting users explicit authority to control the Lifeline Advisor and Agent

Grant explicit authority to all users that can start, stop, or modify the Lifeline Advisor and Agent, to prevent unauthorized users from controlling it. If you do not grant explicit authority, any user that is able to issue the START, STOP, or MODIFY command can control the Lifeline Advisor and Agent.

About this task

Restriction: The only commands that you can issue against the Lifeline Advisor and Agent are MODIFY commands, with the exception of the START command that you use to start the Lifeline Advisor or Agent or the STOP command that you use to stop the Lifeline Advisor or Agent. Limit which users are able to issue the START, STOP, and MODIFY commands for these two servers.

To grant users explicit authority to start, stop, or modify the Lifeline Advisor and Agent, complete the following steps:

Procedure

1. Issue the following two commands to ensure that the OPERCMDS class is active and that RACLIST processing is enabled:

```
SETOPTS CLASSACT(OPERCMD5)
SETOPTS RACLIST (OPERCMD5)
```
2. Define the following OPERCMDS class profile using a security product like RACF® for the Lifeline Advisor:

```
RDEFINE OPERCMDS (MVS.SERVMMGR.LLADVSR) UACC(NONE)
```
3. Define the following OPERCMDS class profile using a security product like RACF for the Lifeline Agent:

```
RDEFINE OPERCMDS (MVS.SERVMMGR.LLAGENT) UACC(NONE)
```
4. Permit the Lifeline Advisor to the OPERCMDS class profile:

- ```
PERMIT MVS.SERVMMGR.LLADVSR CLASS(OPERCMD5) ACCESS(CONTROL) ID(userid)
```
5. Permit the Lifeline Agent to the OPERCMD5 class profile:

```
PERMIT MVS.SERVMMGR.LLAGENT CLASS(OPERCMD5) ACCESS(CONTROL) ID(userid)
```
  6. Issue the following command to refresh the OPERCMD5 class profile:

```
SETROPTS RACLIST(OPERCMD5) REFRESH
```

---

## Authorizing the Lifeline Advisors to use BCPii

You need to grant Lifeline Advisors general authority to use the Base Control Program Internal Interface (BCPii), including authority to specific resources such as the interconnected Central Processor Complexes (CPCs) and images on those CPCs.

### About this task

To allow a Lifeline Advisor to query CPC and image information, complete the following steps. See “Using the Base Control Program Internal Interface” on page 25 for more information.

### Procedure

1. Issue the following two commands to ensure that the FACILITY class is active and that RACLIST processing is enabled:

```
SETROPTS CLASSACT(FACILITY)
SETROPTS RACLIST (FACILITY)
```
2. Define the following FACILITY class profile for authority to use BCPii:

```
RDEFINE FACILITY HWI.APPLNAME.HWISERV UACC(NONE)
```
3. Permit the Lifeline Advisor to the FACILITY class:

```
PERMIT HWI.APPLNAME.HWISERV CLASS(FACILITY) ACCESS(READ) ID(userid)
```
4. Define the following FACILITY class profile (one for each CPC) for authority to query the CPC.

```
RDEFINE FACILITY HWI.TARGET.netid.nau UACC(NONE) APPLDATA(community-name)
```

Where:

- *netid.nau* represents the 3 to 17 character SNA name of the particular CPC.
- *community-name* is the SNMP community name that was defined on the Support Element for that CPC.

5. Permit the Lifeline Advisor to each of the FACILITY class profiles:

```
PERMIT HWI.TARGET.netid.nau CLASS(FACILITY) ACCESS(READ) ID(userid)
```
6. Define the following FACILITY class profile (one for each CPC) for authority to query each image of the CPC.

```
RDEFINE FACILITY HWI.TARGET.netid.nau.* UACC(NONE)
```

Where:

- *netid.nau* represents the 3 to 17 character SNA name of the particular CPC.

7. Permit the Lifeline Advisor to each of these FACILITY class profiles:

```
PERMIT HWI.TARGET.netid.nau.* CLASS(FACILITY) ACCESS(READ) ID(userid)
```
8. Issue the following command to refresh the FACILITY class profile:

```
SETROPTS RACLIST(FACILITY) REFRESH
```



---

## Authorizing the Lifeline Advisor to accept secure peer Advisor connections

If you want to authenticate a peer Lifeline Advisor using Application Transparent TLS (AT-TLS), you need to grant the user ID associated with the peer Advisor access to the AQS.LLADVSR.ADVISORACCESS resource.

### About this task

To authenticate a peer Lifeline Advisor by using AT-TLS, grant the peer Advisor access to the AQS.LLADVSR.ADVISORACCESS resource. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring AT-TLS.

To allow a Lifeline Advisor to authenticate a peer Advisor by using AT-TLS, rather than the `advisor_id_list` Advisor configuration statement, complete the following steps:

### Procedure

1. Issue the following two commands to ensure that the SERVAUTH class is active and that RACLIST processing is enabled:

```
SETOPTS CLASSACT(SERVAUTH)
SETOPTS RACLIST (SERVAUTH)
```

2. Define the following SERVAUTH class profile:

```
RDEFINE SERVAUTH(AQS.LLADVSR.ADVISORACCESS.sysname) UACC(NONE)
```

Where:

- *sysname* is the MVS system name where the local Advisor resides.

3. Grant the user ID associated with the peer Lifeline Advisor READ access to the SERVAUTH class profile:

```
PERMIT AQS.LLADVSR.ADVISORACCESS.sysname CLASS(SERVAUTH) ACCESS(READ) ID(userid)
```

4. Issue the following command to refresh the SERVAUTH class profile:

```
SETOPTS RACLIST(SERVAUTH) REFRESH
```

See Appendix D, “Sample AT-TLS configuration policies,” on page 189 for examples of Lifeline Advisor and peer Lifeline Advisor AT-TLS configurations for a peer Lifeline Advisor connection.

---

## Authorizing the Lifeline Advisor to accept secure Agent connections

If you want to authenticate a Lifeline Agent using Application Transparent TLS (AT-TLS), you need to grant the user ID associated with the Agent access to the AQS.LLADVSR.AGENTACCESS resource.

### About this task

To authenticate a Lifeline Agent by using AT-TLS, grant the Agent access to the AQS.LLADVSR.AGENTACCESS resource. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring AT-TLS.

**Note:** You must configure each Agent IP addresses in the `agent_id_list` Advisor configuration statement, regardless of whether secure Agent connections are used.

To allow a Lifeline Advisor to authenticate an Agent by using AT-TLS, complete the following steps:

## Procedure

1. Issue the following two commands to ensure that the SERVAUTH class is active and that RACLIST processing is enabled:

```
SETROPTS CLASSACT(SERVAUTH)
SETROPTS RACLIST (SERVAUTH)
```

2. Define the following SERVAUTH class profile:

```
RDEFINE SERVAUTH (AQS.LLADVSR.AGENTACCESS.sysname) UACC(NONE)
```

Where:

- *sysname* is the MVS system name where the Advisor resides.

3. Grant the user ID associated with the Lifeline Agent READ access to the SERVAUTH class profile:

```
PERMIT AQS.LLADVSR.AGENTACCESS.sysname CLASS(SERVAUTH) ACCESS(READ) ID(userid)
```

4. Issue the following command to refresh the SERVAUTH class profile:

```
SETROPTS RACLIST(SERVAUTH) REFRESH
```

See Appendix D, “Sample AT-TLS configuration policies,” on page 189 for examples of Lifeline Advisor and peer Lifeline Advisor AT-TLS configurations for a peer Lifeline Advisor connection.

---

## Authorizing the Lifeline Advisor to accept secure Load Balancer connections

If you want to authenticate a load balancer using Application Transparent TLS (AT-TLS), you need to grant the user ID associated with the load balancer access to the AQS.LLADVSR.LBACCESS resource.

### About this task

To authenticate a load balancer by using AT-TLS, grant the load balancer access to the AQS.LLADVSR.LBACCESS resource. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring AT-TLS.

**Note:** You must configure each load balancer IP addresses in the `lb_id_list` Advisor configuration statement, regardless of whether secure load balancer connections are used.

To allow a Lifeline Advisor to authenticate a load balancer by using AT-TLS, complete the following steps:

## Procedure

1. Issue the following two commands to ensure that the SERVAUTH class is active and that RACLIST processing is enabled:

```
SETROPTS CLASSACT(SERVAUTH)
SETROPTS RACLIST (SERVAUTH)
```

2. Define the following SERVAUTH class profile:

```
RDEFINE SERVAUTH (AQS.LLADVSR.LBACCESS.sysname) UACC(NONE)
```

Where:

- *sysname* is the MVS system name where the Advisor resides.

3. Grant the user ID associated with the load balancer READ access to the SERVAUTH class profile:

```
PERMIT AQS.LLADVSR.LBACCESS.sysname CLASS(SERVAUTH) ACCESS(READ) ID(userid)
```

4. Issue the following command to refresh the SERVAUTH class profile:  

```
SETOPTS RACLIST(SERVAUTH) REFRESH
```

See Appendix D, “Sample AT-TLS configuration policies,” on page 189 for examples of Lifeline Advisor and peer Lifeline Advisor AT-TLS configurations for a peer Lifeline Advisor connection.

---

## Authorizing the Lifeline Agents to use WLM services

You need to grant Lifeline Agents access to the BPX.WLMSEVER resource only if you have already defined the resource profile.

### About this task

If you are using RACF and have already defined the resource profile and enabled the FACILITY class, grant Lifeline Agents access to that resource.

If you are using a security product other than RACF that by default denies access to the resource, grant the Lifeline Agents access to the resource.

If you are using RACF, complete the following steps to define the resource profile if you have not defined it, and grant Lifeline Agents access to the resource:

### Procedure

1. Issue the following two commands to ensure that the FACILITY class is active and that RACLIST processing is enabled:  

```
SETOPTS CLASSACT(FACILITY)
SETOPTS RACLIST (FACILITY)
```
2. Define the following FACILITY class profile:  

```
RDEFINE FACILITY (BPX.WLMSEVER) UACC(NONE)
```
3. Grant the Lifeline Agent READ access to the FACILITY class profile:  

```
PERMIT BPX.WLMSEVER CLASS(FACILITY) ACCESS(READ) ID(userid)
```
4. Issue the following command to refresh the FACILITY class profile:  

```
SETOPTS RACLIST(FACILITY) REFRESH
```

---

## Authorizing the Lifeline Agents to reset active connections

You need to grant Lifeline Agents access to the MVS.VARY.TCPIP.DROP resource.

### About this task

To process a Lifeline Advisor DEACTIVATE command, the Lifeline Agents must be able to reset active connections that have been identified by the Advisor. See “MODIFY *advisor\_proc*,DEACTivate command: Deactivate workloads” on page 87 for more information.

To grant Agents explicit authority to reset active connections, complete the following steps:

### Procedure

1. Issue the following two commands to ensure that the OPERCMDS class is active and that RACLIST processing is enabled:  

```
SETOPTS CLASSACT(OPERCMDS)
SETOPTS RACLIST (OPERCMDS)
```

2. Define the following OPERCMDS class profile:  
`RDEFINE OPERCMDS (MVS.VARY.TCPIP.DROP) UACC(NONE)`
3. Permit the Lifeline Agent to the OPERCMDS class profile:  
`PERMIT MVS.VARY.TCPIP.DROP CLASS(OPERCMDS) ACCESS(CONTROL) ID(userid)`
4. Issue the following command to refresh the OPERCMDS class profile:  
`SETROPTS RACLIST(OPERCMDS) REFRESH`

---

## Granting a network management application authority to use the Network Management Interface

Multi-site Workload Lifeline provides a Network Management Interface (NMI) to allow an application to retrieve workload states, server application metrics, and connection status from the Lifeline Advisor.

### About this task

To use this NMI, you must allow the *userid* associated with the application to either have superuser authority or grant access to the AQS.NETMGMT.DISPLAY resource.

To allow the application to use the NMI without having superuser authority, complete the following steps to grant access to the AQS.NETMGMT.DISPLAY resource:

### Procedure

1. Issue the following two commands to ensure that the SERVAUTH class is active and that RACLIST processing is enabled:  
`SETROPTS CLASSACT(SERVAUTH)`  
`SETROPTS RACLIST (SERVAUTH)`
2. Define the following SERVAUTH class profile:  
`RDEFINE SERVAUTH AQS.NETMGMT.DISPLAY UACC(NONE)`
3. Permit the user ID that is associated with the application READ access to the SERVAUTH class profile:  
`PERMIT AQS.NETMGMT.DISPLAY ACCESS(READ) CLASS(SERVAUTH) ID(userid)`
4. Issue the following command to refresh the SERVAUTH class profile:  
`SETROPTS RACLIST(SERVAUTH) REFRESH`

---

## Chapter 3. Configuring Multi-site Workload Lifeline

You need to configure Multi-site Workload Lifeline before you can use it to balance TCP/IP workloads among different z/OS sites.

### Before you begin

Complete the tasks in Chapter 2, “Preparing to use Multi-site Workload Lifeline,” on page 11.

---

### Lifeline Advisor configuration file

You specify the Lifeline Advisor configuration file on the CONFIG DD statement in the Lifeline Advisor started procedure to configure both the primary and secondary Lifeline Advisors.

The Lifeline Advisor configuration file serves the following basic purposes:

- Defines the listening sockets for the external load balancers, the secondary Lifeline Advisor, and Lifeline Agents
- Provides an access control list for specifying which external load balancers, Lifeline Advisor, and Lifeline Agents can connect to the primary Lifeline Advisor
- Associates each second-tier load balancer to a site for all the defined workloads
- Customizes optional parameters

The Lifeline Advisor reads configuration data from one file, which can be a z/OS UNIX file, a PDS or PDSE member, or a sequential data set.

See Appendix A, “A sample started procedure for Lifeline Advisors,” on page 175 for a sample Advisor start procedure.

---

### Lifeline Agent configuration file

You specify the Lifeline Agent configuration file on the CONFIG DD statement in the Lifeline Agent start procedure.

The Lifeline Agent configuration file serves three basic purposes:

- Defines the IP address and port that the Lifeline Agent binds to for communication with the Lifeline Advisor
- Identifies the IP address and port of the Lifeline Advisor
- Customizes optional parameters

The Lifeline Agent configuration file can be a z/OS UNIX file, a PDS or PDSE member, or a sequential data set.

See Appendix B, “A sample started procedure for Lifeline Agents,” on page 177 for a sample Agent start procedure.

---

## Configuring one Lifeline Advisor as the primary Advisor, and optionally one as the secondary Advisor

Use the Lifeline Advisor configuration file to configure one Lifeline Advisor as the primary Advisor. You can also use this file to configure an optional secondary Lifeline Advisor.

### About this task

Only one Lifeline Advisor can serve as a primary Advisor at any given time. To start a secondary Lifeline Advisor to take over primary Advisor responsibilities in the case of a failure of the primary Advisor, specify identical statements in the Lifeline Advisor configuration file for both the primary and secondary Lifeline Advisors.

Complete the following steps to configure Lifeline Advisors:

### Procedure

1. Define listening sockets, ports, or both.
  - a. Specify the local IPv4 address and port that the Lifeline Advisor listens on for IPv4 load balancer connections on the `lb_connection_v4` configuration statement. The default port for communications with external load balancers is 3860. You can also specify the local IPv6 address and port that the Lifeline Advisor listens on for IPv6 load balancer connections on the `lb_connection_v6` configuration statement.

**Guideline:** To enable the movement of the primary Lifeline Advisor to another system when the Lifeline Advisor or its underlying system fails, specify a dynamic VIPA (DVIPA) on the `lb_connection_v4` and `lb_connection_v6` statements. Furthermore, make this DVIPA a unique application-instance DVIPA (defined through `VIPARANGE`) rather than a multiple application-instance DVIPA (defined through `VIPADefine`). For more information about configuring DVIPAs, see *z/OS Communications Server: IP Configuration Reference*.

### Rules:

- Run the Lifeline Advisor on an INET system. If you run the Lifeline Advisor on a CINET system, the address or addresses that you specify on the `lb_connection_v4` or `lb_connection_v6` statement tie the Lifeline Advisor to the stack owning those addresses. Consequently, the termination of that stack results in the termination of the Lifeline Advisor.
  - If the primary Lifeline Advisor is using IPv6 for the external load balancer connections, or if any Lifeline Agents are using IPv6 to connect to the Lifeline Advisor, you must configure the system in which the secondary Lifeline Advisor resides to be enabled for IPv6.
- b. Specify the local port that the Lifeline Advisor listens on for Lifeline Agent connections on the `agent_connection_port` statement. If the TCP/IP stack of the Lifeline Advisor is enabled for IPv6, the Lifeline Advisor opens a listening socket for Lifeline Agents on the IPv6 unspecified address (::) on the port specified by this statement. This enables Lifeline Agents to connect to the Lifeline Advisor using either the IPv4 address specified on the `lb_connection_v4` statement or the IPv6 address specified on the `lb_connection_v6` statement. If the TCP/IP stack is not enabled for IPv6, the Lifeline Advisor opens a listening socket on the IPv4 unspecified address,

0.0.0.0. This enables Lifeline Agents to connect to the Lifeline Advisor using only the IPv4 address specified on the `lb_connection_v4` statement.

- c. Specify the local port that the Lifeline Advisor listens on for a connection from the secondary Lifeline Advisor on the `advisor_connection_port` statement. The same information specified in the previous step about the use of the `lb_connection_v4` and `lb_connection_v6` statements applies in this step.
2. Define the access control list.

**Rule:** Specify only complete IP addresses in access control lists. Subnetworks, IP prefixes, or other types of wildcards are not allowed.

- a. Specify the list of external load balancers that are allowed to connect to the Lifeline Advisor on the `lb_id_list` statement. A maximum limit of 100 external load balancers can be connected to a Lifeline Advisor at any given time.

You can also use Application Transparent TLS (AT-TLS) to authenticate external load balancers. If you use AT-TLS for a load balancer, you still need to include the IP address of that load balancer in the `lb_id_list` statement. See “Authorizing the Lifeline Advisor to accept secure Load Balancer connections” on page 14 for more information.

- b. Specify the list of secondary Lifeline Advisors that are allowed to connect to the primary Lifeline Advisor on the `advisor_id_list` statement. Only a single secondary Lifeline Advisor can be connected to the primary Lifeline Advisor at any given time.

You can also use Application Transparent TLS (AT-TLS) to authenticate secondary Lifeline Advisors. If you use AT-TLS for a secondary Advisor, you do not need to include the IP address of that Advisor in the `advisor_id_list` statement. See Authorizing the Lifeline Advisor to accept secure peer Advisor connections for more information.

- c. Specify the list of Lifeline Agents that are allowed to connect to the primary Lifeline Advisor on the `agent_id_list` statement.

You can also use Application Transparent TLS (AT-TLS) to authenticate Lifeline Agents. If you use AT-TLS for an Agent, you still need to include the IP address of that Agent in the `agent_id_list` statement. See Authorizing the Lifeline Advisor to accept secure Agent connections for more information.

3. Update the TCP/IP profiles on the systems where the primary and secondary Advisors reside to add the `VIPARANGE` definition that configures the IP address used in the `lb_connection_v4` and `lb_connection_v6` Advisor configuration statements.
4. Define an OMVS segment for the Lifeline Advisor. The Lifeline Advisor accesses files in the UNIX System Services shell, so the Lifeline Advisor needs to have an OMVS segment defined for it. You can use the following JCL snippet to define the OMVS segment:

```
//EZARACF JOB MSGLEVEL=(1,1),MSGCLASS=A,CLASS=A
//DAEMONS EXEC PGM=IKJEFT01
//SYSTSPRT DD SYSOUT=*
//SYSTSIN DD *
ADDUSER userid DFLTGRP(OMVSGRP) OMVS(UID(0) HOME('/'))
RDEFINE STARTED userid.* STDATA(USER(userid))
SETROPTS RACLIST(STARTED) REFRESH
/*
```

5. Optional: Customize optional statements, including the `update_interval`, `failure_detection_interval`, and `debug_level` statements.



**Guideline:** In most cases, do not customize the `debug_level` statement, unless you are directed to do so by an IBM service representative. Adding additional types of trace data can cause the amount of captured data to become voluminous. Reducing the amount of trace data from the default might make diagnosing a problem more difficult.

- Optional: Change the location of the Multi-site Workload Lifeline message catalog. The Lifeline Advisor uses a standard message catalog. The message catalog must be in the z/OS UNIX file system. The default location of the message catalog is `/usr/lib/nls/msg/C/aqsl1msg.cat`. If you want to store the message catalog in another location, you need to change the `NLSPATH` or the `LANG` environment variables. To change the two environment variables, you can update the started procedure of the Lifeline Advisor to pass the `ENVAR` option to set `NLSPATH`. If `aqsl1msg.cat` does not exist, the Lifeline Advisor by default uses the messages hardcoded in the software. These messages duplicate the English message catalog that is shipped with the Multi-site Workload Lifeline product.

---

## Configuring a Lifeline Agent

Use the Lifeline Agent configuration file to configure one Lifeline Agent per z/OS target system across both sites.

### About this task

Only one Lifeline Agent can be active per z/OS system at any time. Complete the following steps to configure Lifeline Agents:

### Procedure

- Specify the local IP address and port that the Lifeline Agent binds to for communicating with the Lifeline Advisor on the `host_connection` statement. This step is used as part of the Lifeline Advisor's access control enforcement.

**Guideline:** For high availability, use a static VIPA as the local IP address to tolerate individual link outages on the z/OS system. For more information about configuring static VIPAs, see *z/OS Communications Server: IP Configuration Reference*.

- Specify the IP address and port of the Lifeline Advisor on the `advisor_id` statement.
- Update the TCP/IP profiles on the systems where the Agents reside to add the static VIPA definition that configures the IP address used in the `host_connection` Agent configuration statement.

You can also use Application Transparent TLS (AT-TLS) to authenticate Agents. See *Authorizing the Lifeline Advisor to accept secure Agent connections* for more information.

- Define an OMVS segment for the Lifeline Agent. The Lifeline Agent accesses files in the UNIX System Services shell, so you need to define an OMVS segment for the Lifeline Agent. You can use the following JCL snippet to define the OMVS segment:

```
//EZARACF JOB MSGLEVEL=(1,1),MSGCLASS=A,CLASS=A
//DAEMONS EXEC PGM=IKJEFT01
//SYSTSPRT DD SYSOUT=*
//SYSTSIN DD *
```



```

ADDUSER userid DFLTGRP(OMVSGRP) OMVS(UID(0) HOME('/'))
RDEFINE STARTED userid.* STDATA(USER(userid))
SETROPTS RACLIST(STARTED) REFRESH
/*

```

- Optional: Use the `debug_level` statement to specify how much trace data is captured in the log file of the Lifeline Agent.

**Rule:** In most cases, you should not customize this statement, unless you are directed to do so by an IBM service representative. Adding additional types of trace data can cause the amount of data captured to become voluminous. Reducing the amount of trace data from the default might make diagnosing a problem more difficult.

- Optional: Change the location of the Multi-site Workload Lifeline message catalog. The Lifeline Agent uses a standard message catalog. The message catalog must be in the z/OS UNIX file system. The default location of the message catalog is `/usr/lib/nls/msg/C/aqsl1msg.cat`. If you want to store the message catalog in another location, you need to change the `NLSPATH` or the `LANG` environment variables. To change the two environment variables, you can update the started procedure of the Lifeline Agent to pass the `ENVAR` option to set `NLSPATH`. If `aqsl1msg.cat` does not exist, the Lifeline Agent by default uses the messages hardcoded in the software. These messages duplicate the English message catalog that is shipped with the Multi-site Workload Lifeline product.

## WLM recommendations

The Lifeline Agents use a WLM recommendation that is referred to as server-specific WLM. Server-specific WLM provides a relative measure of the ability of a target system to handle additional workload requests, as compared to other systems across both sites. It also indicates how well individual server applications are doing compared to the WLM policy goals that have been specified for that workload.

Server-specific WLM recommendations are composed of two key elements:

- The amount of displaceable capacity (general, zAAP, and zIIP) available on the target system, based on the importance level of the server application, and the proportion of general, zAAP, and zIIP CPU that is currently being consumed by the workload of the application. For example, if the application is using only general and zAAP CPU, the displaceable zIIP capacity is not considered.
- The performance of the application compared to the WLM goals for that application workload.

WLM provides an interface that enables server applications to report the following additional information:

- The abnormal transaction completion rate, or the rate of abnormal completions per 1000 total transactions
- Application health, which is a value in the range 0 - 100% (100% is optimal), representing the overall health of the server application

---

## Configuring Lifeline Advisors to automatically restart

You can use automation software or define an automatic restart manager (ARM) policy to automatically restart the Lifeline Advisor in case the Advisor or system fails. Although this task is optional, you should restart the Lifeline Advisor as soon as possible after it fails.

## About this task

The restart capability covers scenarios where the Lifeline Advisor itself fails; in scenarios where the system the Lifeline Advisor is running on fails, you can configure a secondary Lifeline Advisor to automatically take over primary Advisor responsibilities.

If the Lifeline Advisor or its underlying system fails, and no secondary Lifeline Advisor is configured to automatically take over primary Advisor responsibilities, an external load balancer might do one of the following things:

- Continue to distribute workload requests according to the last set of information received from the Lifeline Advisor
- Resort to pre-configured weights
- Stop distributing new workload requests to second-tier load balancers or server applications

The actual behavior depends on the load balancer implementation. Consult the load balancer documentation for your specific external load balancer for details.

You need to restart the Lifeline Advisor as soon as possible when the Lifeline Advisor itself fails, or configure a secondary Lifeline Advisor to automatically take over primary Advisor responsibilities when the system on which the Lifeline Advisor is running fails.

For more information about defining ARM policies, see *z/OS MVS Setting Up a Sysplex*.

The Lifeline Advisor registers with ARM using the following values:

- ELEMTYPE=SYSLVL1
- ELEMNAME=AQSLADVSR
- TERMTYPE=ELEMTERM

These values indicate that if the Lifeline Advisor fails on this system, the Lifeline Advisor needs to be restarted only on this system.

To configure Lifeline Advisors to automatically restart using ARM, complete the following step:

### Procedure

Update the IXCARM resource. The Lifeline Advisors do not run using a system key. If you are using ARM registration, the started task IDs must be permitted with UPDATE authority to the IXCARM.SYSLVL1.AQSLADVSR resource profile in the FACILITY class using the SAF product on your system. To enable the Advisor to register with ARM, use the following RACF commands to define the profiles and grant update access:

```
RDEFINE FACILITY IXCARM.SYSLVL1.AQSLADVSR UACC(NONE)
PERMIT IXCARM.SYSLVL1.AQSLADVSR CLASS(FACILITY) ID(userid) ACCESS(UPDATE)
SETROPTS RACLIST(FACILITY) REFRESH
```

## Recovering from a planned outage of the TCP/IP stack

If you use automatic restart manager (ARM) and the TCP/IP stack address space terminates, you need to be sure that the system can recover from a planned outage of the TCP/IP stack.

## About this task

When the TCP/IP stack becomes unavailable, the Lifeline Advisor also terminates, because the Advisor can no longer establish any TCP/IP communications. An ARM restart of the Lifeline Advisor will likely fail if the TCP/IP stack is not available when the restart occurs. Complete the following steps to recover from a planned outage of the TCP/IP stack:

### Procedure

1. Ensure that a secondary Lifeline Advisor has been started on another system.
2. Configure the secondary Lifeline Advisor to automatically take over primary Advisor responsibilities as soon as the primary Lifeline Advisor terminates on the system where TCP/IP is stopped.

## Recovering from an unplanned outage of the TCP/IP stack

If you are using automatic restart manager (ARM) and the TCP/IP stack address space terminates, you need to be sure that the system can recover from an unplanned outage of the TCP/IP stack.

## About this task

When the TCP/IP stack becomes unavailable, the Lifeline Advisor also terminates, because the Advisor can no longer establish any TCP/IP communications. An ARM restart of the Lifeline Advisor will likely fail if the TCP/IP stack is not available when the restart occurs. Complete the following steps to recover from an unplanned outage of the TCP/IP stack:

### Procedure

1. Ensure that an ARM policy or other automation is in place to quickly restart the TCP/IP stack on the same system.
2. Quickly restart the Lifeline Advisor on the same system. You can restart the Lifeline Advisor by using an automation software package, or by using the TCP/IP profile AUTOLOG statement. For more information about the AUTOLOG statement, see *z/OS Communications Server: Configuration Reference*.

---

## Configuring Lifeline Agents to automatically restart

You can use automation software or define an automatic restart manager (ARM) policy to automatically restart the Lifeline Agent in case the Agent or system fails. Although this task is optional, you can complete it to provide high availability to your target applications.

## About this task

When a Lifeline Agent fails, the Lifeline Advisor indicates that it has no information for any server applications running on that system. As a result, if the second-tier load balancer responsible for distributing workload requests for this site is an external load balancer, target applications on the failing system will no longer receive new workload requests until the Lifeline Agent is restarted. Automatically restarting the Lifeline Agent on the same system minimizes this perceived outage. For more information about defining ARM policies, see *z/OS MVS Setting Up a Sysplex*.

**Tip:** If the second-tier load balancer is z/OS sysplex distributor, target applications on the failing system might continue to receive new workload requests, as z/OS sysplex distributor does not rely on the Lifeline Agent to retrieve information about these target applications.

The Lifeline Agent registers with ARM using the following values:

- ELEMTYPE=SYSLVL1
- ELEMNAME=AQSLLAGENT
- TERMTYPE=ELEMTERM

These values indicate that if the Lifeline Agent fails on this system, the Lifeline Agent needs to be restarted only on this system.

To configure Lifeline Agents to automatically restart using ARM, complete the following step:

### Procedure

Update the IXCARM resource. The Lifeline Agents do not run using a system key. If you are using ARM registration, the started task IDs must be permitted with UPDATE authority to the IXCARM.SYSLVL1.AQSLLAGENT resource profile in the FACILITY class using the SAF product on your system. To enable the Agent to register with ARM, use the following RACF commands to define the profiles and grant update access:

```
RDEFINE FACILITY IXCARM.SYSLVL1.AQSLLAGENT UACC(NONE)
PERMIT IXCARM.SYSLVL1.AQSLLAGENT CLASS(FACILITY) ID(userid) ACCESS(UPDATE)
SETROPTS RACLIST(FACILITY) REFRESH
```

---

## Migrating IBM Multi-site Workload Lifeline

### About this task

When you migrate the Lifeline Advisors and Lifeline Agents to the current level, you do not need to stop all Advisors and Agents and migrate them at the same time.

**Tip:** Migrate both the primary and secondary Advisors before you migrate the individual Agents.

---

## Migrating the Lifeline Advisor

### About this task

To migrate the Lifeline Advisors to V2R0, migrate the secondary Advisor first.

**Rule:** If the primary Advisor is at a later release than the secondary Advisor, the secondary Advisor cannot be started because the connection to the primary Advisor fails. Message AQS0167I is issued on the primary Advisor.

### Procedure

1. Stop the secondary Advisor.
2. Migrate the secondary Advisor to the current release.
3. Optional: Update the configuration file of the secondary Advisor to enable functions introduced in the release.

**Rule:** If the `query_workload_list` Advisor configuration statement is coded and the `timeout` parameter specified, the `timeout` parameter is ignored and message AQS0311W is issued until all Agents are updated to V2R0. See Multi-site Workload Lifeline configuration statements for more information about configuration statements and parameters.

- Restart the secondary Advisor.
- Perform an Advisor takeover by using the `MODIFY procname,TAKEOVER` command on the secondary Advisor.

**Note:** The peer Advisor will not remain active when it tries to become the secondary Advisor.

- Update the peer Advisor to the current release.
- Update the configuration file of the peer Advisor to match the primary Advisor's configuration.
- Restart the peer Advisor as the secondary Advisor.
- Optional: Perform an Advisor takeover by using the `MODIFY procname,TAKEOVER` command on the peer Advisor, so that it is made the primary Advisor again.

---

## Migrating the Lifeline Agent

### About this task

Each Lifeline Agent can be migrated to V2R0, independent of the release level of the other Agents.

### Procedure

- Stop the Agent.
- Update the Agent to the current release.
- Optional: Update the configuration file of the Agent to enable functions that are introduced in the release.
- Restart the Agent.

---

## Using the Base Control Program Internal Interface

The Lifeline Advisor uses Base Control Program Internal Interface (BCPii) services to periodically query all interconnected Central Processor Complexes (CPCs) and the images (LPARs) on these CPCs.

### About this task

The Hardware Management Console (HMC) and Support Elements on each CPC typically communicate over a network that is separate from the network used for TCP/IP communications. The Advisor queries the images in a site over this network to determine whether the images are available or whether a site failure has occurred.

For these queries to succeed, complete the following steps:

### Procedure

- Configure the Support Elements to support BCPii. You need to define an SNMP community name, and be sure that the BCPii address space is active. See the

information about BCPii in *z/OS MVS Programming: Callable Services for High-Level Languages* for more information.

2. Authorize the Lifeline Advisor to use the BCPii services. See “Authorizing the Lifeline Advisors to use BCPii” on page 12 for more information.

---

## Configuring and starting syslogd

For the Lifeline Advisors and Agents to be able to write their log messages and trace data to the syslog daemon (syslogd), you must configure and start syslogd before you start the Advisor and Agent.

### Before you begin

**Note:** This task is optional if the AQSTRACE DD card is specified in the Advisor and Agent started procedure, because internal memory will be used to log messages and trace data. If syslogd is also started, only log messages at the ERROR, WARNING, and EVENT level are written to syslogd.

### About this task

The Lifeline Advisor and Agent write most log messages and trace data to the syslog daemon (syslogd). A limited number of messages are written to the MVS console, but these are unaffected by syslogd configuration.

As more data is logged by the Lifeline Advisor and Agent, performance of the Lifeline Advisor and Agent can be adversely affected. The amount of data that is logged by the Lifeline Advisor and Agent is determined by the `debug_level` statement. If you back up the syslogd output file with a zFS file system instead of a z/OS UNIX file system, you can minimize performance impacts caused by logging.

#### Tips:

- To further reduce the performance impact caused by logging to syslogd, add the AQSTRACE DD card in the Advisor and Agent started procedures.
- Logging to syslogd occurs at a default level until the configuration file has been read in.

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

---

## Customizing the TCP/IP profiles of the TCP/IP stacks

To accommodate the Lifeline Advisors and Agents, you need to customize the TCP/IP profiles of the TCP/IP stacks that the Lifeline Advisors and Agents will run on.

### About this task

Complete the following steps to customize the TCP/IP profiles of the TCP/IP stacks:

#### Procedure

1. Reserve the ports that the Lifeline Advisor and Agents will use in their respective TCP/IP profiles. All ports for the Lifeline Advisor and Agent use the

TCP protocol; reserve all the ports for TCP. The Lifeline Advisor has at least two ports, and potentially four ports, to reserve, including the ports specified on the following statements:

- lb\_connection\_v4
- lb\_connection\_v6
- agent\_connection\_port
- advisor\_connection\_port

The Lifeline Agent has one port to reserve, which you specify on the following statement:

- host\_connection
2. Configure VIPARANGE with the IP addresses specified on the Lifeline Advisor lb\_connection\_v4 and lb\_connection\_v6 statements on the TCP/IP stacks of the systems that the Lifeline Advisor can run on, and configure static VIPAs with the IP address specified on the Lifeline Agent host\_connection statement on the TCP/IP stack of the system that the corresponding Lifeline Agent can run on.
  3. Optional: If you use the SHAREPORT or SHAREPORTWLM parameters on the TCP/IP profile PORT statement to enable multiple TCP server applications to share the same port, some additional considerations might apply to your configuration. For example, if the TCP server applications sharing the same port are also members of groups that are reported to external second-tier load balancers with SASP, ensure that consistent criteria are used by the various load balancing components. When using the Multi-site Workload Lifeline, all instances of a TCP server application that share the same port on a target system are reported to external second-tier load balancers using a single member entry, and therefore, a single recommendation. This recommendation reflects the average net weight calculated for all the server applications sharing the same port on a target system. When the TCP connection requests reach a target TCP/IP stack and multiple server applications are sharing the same port, the connections are then load balanced by TCP/IP across the multiple server application instances.

How this load balancing process is performed depends on whether you specify the SHAREPORT or SHAREPORTWLM parameter on the PORT statement. For more details about the PORT statement, see *z/OS Communications Server: IP Configuration Reference*.

## CINET considerations

Although it is not recommended, the Lifeline Advisor can use multiple TCP/IP stacks in a Common INET (CINET) environment.

To simplify your configuration and to make Lifeline Advisor outages that are the result of a TCP/IP stack failure or termination more predictable and recoverable, configure all incoming connections to the Lifeline Advisor to use a single TCP/IP stack. The addresses that you specify in the lb\_connection\_v4 and lb\_connection\_v6 statements must belong to the same TCP/IP stack.

Use a VIPARANGE statement to define these dynamic VIPAs in the TCP/IP profiles of all the stacks in the CINET environment.

If the Lifeline Advisor is restarted as a result of failure in a given TCP/IP stack, the dynamic VIPAs are then activated on another TCP/IP stack in that system. If you decide to use the IPv4 or IPv6 unspecified addresses for the lb\_connection\_v4 and lb\_connection\_v6 statements, use the BIND parameter on the PORT



reservation statement to bind these sockets to the dynamic VIPAs on the one TCP/IP stack that you have decided to use.

---

## Configuring external load balancers

Configure external load balancers with the IP address and port of the Lifeline Advisor.

### About this task

**Guideline:** If the Lifeline Advisor uses IPv6 for the external load balancer connections or if any Lifeline Agents use IPv6 to connect to the Lifeline Advisor, start the secondary Lifeline Advisor only on a system that supports IPv6.

For maximum availability, define the IP address of the Lifeline Advisor as a VIPARANGE DVIPA.

There is a maximum limit of 100 external load balancers that can be connected to a Lifeline Advisor at any given time.

Complete the following tasks to configure external load balancers:

### Procedure

1. Configure the first-tier external load balancers.
2. Configure the second-tier load balancers. You can have either an external load balancer or a z/OS sysplex distributor on one z/OS target server in each site.

## Configuring first-tier external load balancers

Configure the first-tier external load balancers with the IP address and port of the Lifeline Advisor.

### About this task

Complete the following steps to configure the first-tier external load balancers:

### Procedure

1. Customize features of the communication of the external load balancer with the Lifeline Advisor. For more information about the features, see “External load balancers” on page 8.
2. Optional: Configure redundant external load balancers for availability reasons. The unique load balancer identifier (LB UID), sometimes referred to as the UID or UUID, of the external load balancer identifies a load balancer. Duplicate LB UIDs are not allowed and connection attempts to the Lifeline Advisor from an external load balancer using the same LB UID as an existing connection force the existing connection to be broken and replaced by the new connection.

### Requirements:

- If you want the redundant load balancers to serve as hot standbys that are connected simultaneously with the load balancer that they are backing up, you must specify unique LB UIDs.
- If you configure the redundant load balancers with the same LB UID, the redundant load balancers must remain unconnected from the Lifeline Advisor until the original load balancer fails.



3. Configure external first-tier load balancers to use directed mode. For more information about directed mode, see “External load balancers” on page 8.

**Rule:** Always configure first-tier load balancers to use directed mode. These load balancers route workload requests only to second-tier load balancers.

4. Configure each first-tier external load balancer with the members that represent the second-tier load balancers.
  - a. Define members that can share the same type of workload under the same load balancer application group. For example, define members for a TN3270E workload under one group and members for an HTTP workload under another. If server applications that access the same data sources are of different types, configure a single workload for these server applications, but define a different application group for each server application type. This ensures that the loss of all server applications in one group will result in the entire workload being treated as non-operational.
  - b. Specify valid and reachable IP addresses, a nonzero port, and a nonzero protocol. The IP addresses of the members must represent the IP address of an external second-tier load balancer or the DVIPA of a z/OS sysplex distributor. The port number represents the port number used by that server application for the workload. Typically, all members in a group use the same port number. The protocol that is defined can be specified as either tcp or udp.

**Rule:** All members must be application members; a nonzero port number must be specified.

## Configuring second-tier external load balancers

Configure the second-tier external load balancers with the IP address and port of the Lifeline Advisor.

### About this task

Complete the following steps to configure the second-tier external load balancers:

### Procedure

1. Customize features of the communication of the external load balancer with the Lifeline Advisor. For more information about the features, see “External load balancers” on page 8.
2. Optional: Configure redundant external load balancers for availability reasons. The unique load balancer identifier (LB UID), sometimes referred to as the UID or UUID, of the external load balancer identifies a load balancer. Duplicate LB UIDs are not allowed and connection attempts to the Lifeline Advisor from an external load balancer using the same LB UID as an existing connection force the existing connection to be broken and replaced by the new connection.

### Requirements:

- If you want the redundant load balancers to serve as hot standbys that are connected simultaneously with the load balancer that they are backing up, you must specify unique LB UIDs.
- If you configure the redundant load balancers with the same LB UID, the redundant load balancers must remain unconnected from the Lifeline Advisor until the original load balancer fails.

3. Configure external second-tier load balancers to use directed mode. For more information about directed mode, see “External load balancers” on page 8.

**Guideline:** You can configure external second-tier load balancers to use either directed or dispatch mode.

4. Configure each external load balancer with the members that represent the individual target application instances.
  - a. Define members that can share the same type of workload under the same load balancer application group. For example, define TN3270E Telnet servers under one group and HTTP servers under another.
  - b. Specify an IP address, a nonzero port, and a nonzero protocol to define application members. The IP addresses of the members must represent valid and reachable addresses in each site where the server applications reside. The port number represents the port number used by that server application and must match the port number specified in the first-tier load balancer for this workload group. Typically, all members in a group will use the same port number. The protocol that is defined can be specified as either tcp or udp and must match the protocol specified in the first-tier load balancer for this workload.

**Rules:**

- All IP addresses configured in members belonging to the same group must exist on all second-tier external load balancers.
- All members must be application members; a nonzero port number must be specified.
- Certain classes of IP addresses must not be coded for members in the external load balancer. This includes the following classes of addresses:
  - Deprecated IPv6 addresses. These are flagged as such in a NETSTAT HOME display. It is probably safest not to code any auto-configured IPv6 addresses within members.
  - Addresses that are not reachable from the load balancer, including loopback addresses.
  - Unavailable IPv6 addresses. These addresses might be marked as unavailable if duplicate address detection is in progress, has failed, or the interface ID is unknown. These addresses are displayed in a NETSTAT HOME display, along with the reason that they are marked as unavailable.

## Configuring second-tier internal load balancers

Configure the second-tier internal load balancers, that is, the z/OS sysplex distributor, with the IP address and port number configured in the first-tier load balancer group that represents the DVIPA being distributed.

### About this task

For information about configuring z/OS sysplex distributors, see *z/OS Communications Server: IP Configuration Reference*.

## Configuring support for Intermediary nodes

Intermediary nodes do not communicate directly with the Lifeline Advisor, but they function as a second-tier load balancer. A first-tier load balancer registers a group of intermediary nodes. The members of the group are mapped to entries in the `intermediary_node_list` statement. The `intermediary_node_list` entries for these registered members are mapped to entries configured in the `cross_sysplex_list`

statement. The `cross_sysplex_list` entries are configured with `sysplex` distributed DVIPAs and ports. The DVIPAs and ports from the `cross_sysplex_list` entries are monitored to determine the weights and availability of the workload's server applications.

## About this task

The members of the registered group are classified as either "Internal" or "External" intermediary nodes.

- A group is an External Intermediary group if no member IP addresses configured in the `intermediary_node_list` statement are defined on any TCP/IP stacks monitored by the Agents; the intermediary nodes are external to the systems where the workload's server applications reside. The ports of the intermediary nodes might not match the ports of the workload's server applications. The `intermediary_node_list` entries are mapped to `cross_sysplex_list` entries by using the site and workload names.
- A group is an Internal Intermediary group if all member IP addresses configured in the `intermediary_node_list` statement are defined on the TCP/IP stacks monitored by the Agents; the intermediary nodes are on the systems where the workload's server applications reside. The ports of the intermediary nodes match the ports of the workload's server applications. The `intermediary_node_list` entries are mapped to `cross_sysplex_list` entries by using the port, site, and workload names.

## Procedure

1. Configure the first-tier external load balancers with the groups of the intermediary nodes.
2. Configure the `cross_sysplex_list` entries with the `sysplex` distributed DVIPAs and ports of the monitored server applications.
3. Configure the `intermediary_node_list` entries for the registered group.
  - If this is an External Intermediary group, the site and workload of an `intermediary_node_list` entry match those of one or more `cross_sysplex_list` entries.
  - If this is an Internal Intermediary group, the port, site, and workload of an `intermediary_node_list` entry match those of one or more `cross_sysplex_list` entries.

See the `cross_sysplex_list` and `intermediary_node_list` statements in Chapter 6, "Multi-site Workload Lifeline configuration statements," on page 47 for more information about how to configure these statements.



---

## Chapter 4. Starting the Lifeline Advisors and Agents

To balance TCP/IP workloads between the two z/OS sites, you need to start the Lifeline Advisors and Agents that make up Multi-site Workload Lifeline.

### Before you begin

You need to first complete the tasks in Chapter 2, “Preparing to use Multi-site Workload Lifeline,” on page 11 and Chapter 3, “Configuring Multi-site Workload Lifeline,” on page 17.

### About this task

You can start the Lifeline Agents before the Lifeline Advisors, or start the Lifeline Advisors before the Lifeline Agents. If you start the Lifeline Advisor after you start the Lifeline Agents, the Lifeline Agents periodically attempt to connect to the Lifeline Advisor.

### Procedure

1. Start the TCP/IP stacks that the Lifeline Advisors and the Agents will use.

**Requirement:** You must start the TCP/IP stacks that the Lifeline Advisors will use before you start the Lifeline Advisors. You can start a Lifeline Agent before the start of the TCP/IP stack that the Lifeline Agent uses. If the TCP/IP stack that the Lifeline Agent uses stops, the Lifeline Agent remains active and reestablishes communication with the TCP/IP stack when the TCP/IP stack is restarted.

2. Start the server applications that will be the target of load balancing. You do not need to modify these server applications, their configurations, or started procedures, unless the second-tier external load balancer is using dispatch mode for packet forwarding. For more information about dispatch mode, see “External load balancers” on page 8.
3. Optional: Customize WLM policies for the Lifeline Advisors and Agents, and assign the Lifeline Advisors and Agents to the WLM SYSSTC service class to receive the proper dispatching priority. For more information about categorizing work into service classes, see *z/OS MVS Planning: Workload Management*.

**Rule:** Ensure that the Lifeline Advisors and Agents receive an adequate amount of system resources to properly balance workloads.

4. Start the primary Lifeline Advisor from a started procedure as a started program (EXEC PGM=). See Appendix A, “A sample started procedure for Lifeline Advisors,” on page 175 for a sample Advisor start procedure. Verify that each Lifeline Agent that you expect to connect to the Lifeline Advisor has connected. You can also use the NETSTAT CONN command on the Lifeline Advisor's TCP/IP stack to see which Lifeline Agents are currently connected. As Lifeline Agents connect to the Lifeline Advisor, messages appear on the MVS consoles where the Advisor and Agents are active.

**Restriction:** You cannot start the Lifeline Advisor under BPXBATCH.

5. Start one Lifeline Agent from a started procedure as a started program (EXEC PGM=) on each z/OS target system that you want to participate in this method

of workload balancing. See Appendix B, "A sample started procedure for Lifeline Agents," on page 177 for a sample Agent start procedure.

- a. Optional: Update the SCHEDxx member to add an entry to the program properties table to make the Lifeline Advisors and Agents run non-swappable.

**Restrictions:**

- You can start only one Lifeline Agent per z/OS system.
  - You must not start the Lifeline Agent under BPXBATCH.
6. Optional: Start the secondary Lifeline Advisor. When the secondary Advisor connects to the primary Advisor, messages are issued on the MVS consoles where each Lifeline Advisor is running.
  7. Start the first-tier and second-tier load balancers. When an external load balancer has connected, a message is issued on the MVS console where the Lifeline Advisor is running.

---

## Chapter 5. Diagnosing problems in Multi-site Workload Lifeline

You can verify the performance and availability of the system and diagnose problems when you use Multi-site Workload Lifeline.

---

### Debug levels

You can update the debug level to change the level of debug messages to be logged.

The following list describes available debug levels and the associated syslogd priority levels:

#### Debug level

#### syslogd priority level

- 0 NONE. No messages of any kind are sent to the syslogd file after initialization is complete.
- 1 ERROR. Error messages indicate something that requires attention. Messages at this level could be fatal (terminating) or could indicate that an integral part of the workload advising system is not working properly. This information is logged at the syslogd ERROR priority level.
- 2 WARNING. Warning messages indicate that an error has occurred, but it is not severe enough to warrant an ERROR. Corrective actions might be necessary because the Advisor or Agent might not be behaving as intended. This information is logged at the syslogd WARNING priority level.
- 4 EVENT. Event messages are logged for events that occur periodically, like operator commands, UNIX signals, timer pops, and receipt of a network message. This information is logged at the syslogd NOTICE priority level.
- 8 INFO. Informational messages are sent to the syslogd file. These messages do not require corrective actions. This information is logged at the syslogd INFO priority level.
- 16 MESSAGE. Message messages log the contents of message packets that are sent between the Advisor and the Load Balancer, the Advisor and peer Advisor, or between the Advisor and Agent. You can use these messages to assist debugging Advisor-to-load balancer, Advisor-to-Advisor, and Advisor-to-Agent communications. This information is logged at the syslogd DEBUG priority level. This level is intended only for IBM service use.
- 32 COLLECTION. Collection messages log the details of collecting and manipulating the data that forms the basis of weight calculations. This information is logged at the syslogd DEBUG priority level. COLLECTION is only used by the Agent. This level is intended only for IBM service use.
- 64 DEBUG. The intention of this level of message is to provide information that is useful in debugging code, logic, or timing errors. This information is logged at the syslogd DEBUG priority level. This level is intended for IBM service use only.

- 128 TRACE. Trace messages are intended for development or service to track code processing (footprints). This information is logged at the syslogd DEBUG priority level. This level is intended for IBM service use only.
- 

## Diagnostic data

You can collect multiple pieces of diagnostic data to diagnose problems.

The following diagnostic data is helpful:

- Console messages for the Lifeline Advisors and Agents
- Output from the MODIFY command for the Lifeline Advisors and Agents
- Either syslogd log messages or AQSTRACE file for Lifeline Advisors and Agents
- Lifeline Advisor and Agent address space dumps and snap output
- TCP/IP packet traces of communication with the primary Lifeline Advisor

### Guidelines:

- If the AQSTRACE DD card is not specified in the Lifeline Advisor or Agent started procedure, syslogd is the only logging facility that either the Advisors or Agents can use. Useful diagnostic information might be lost if syslogd is not running before the Advisor or Agents are started.
- If the AQSTRACE DD card is specified in the Lifeline Advisor and Agent started procedure, you do not have to run syslogd. The Advisors and Agents use internal memory as their logging facility. This internal memory is dumped to the file specified by the AQSTRACE DD card when the Advisor or Agent is stopped, or when the DUMPLOG command is issued. The UNIX System Services file system where the file resides should have 256 MB of available space to prevent truncation of the dumped internal log. A fixed number of debug records are stored in internal memory. When this number of records has been reached, the logging wraps. See Chapter 7, "Lifeline Advisor commands," on page 69 for information about the DUMPLOG command for the Advisor and Chapter 8, "Lifeline Agent commands," on page 93 for information about the DUMPLOG command for the Agent.
- If both syslogd is running and the AQSTRACE DD card is specified, log messages at ERROR, WARNING, and EVENT level are written to both logs. Log messages at more detailed levels, INFO, MESSAGE, COLLECT, DEBUG, and TRACE, are written only to internal memory.

The Lifeline Advisor and Agent trigger address space dumps when they encounter certain unexpected error conditions. Both a CEEDUMP and address space snap output are produced and written to the data sets or files that are specified by the started procedure CEEDUMP and CEESNAP DD statements, respectively.

If the Lifeline Advisor or Agent abnormally stops (for example, an 0C4 abend occurs), an unformatted SYSMDUMP is produced and written to the data set that is specified by the started procedure SYSMDUMP DD statement. If you override the Language Environment<sup>®</sup> run-time option TERMTHDACT during the installation or started procedure, the SYSMDUMP might not be produced, or a CEEDUMP might be produced instead. Therefore, do not override the TERMTHDACT run-time option. See *z/OS Language Environment Programming Guide* for more information about run-time options.

In other situations, the z/OS operator needs to dump the address space manually.



You can collect the TCP/IP packet trace data of communication with the primary Lifeline Advisor. For example, you might need to capture the following communication flows:

- Server/Application State Protocol (SASP) messages sent between the primary Advisor and external load balancers
- Messages sent between the primary Advisor and Agents
- Messages sent between the primary and secondary Advisors

For details about how to use the TCP/IP packet trace facility, see *z/OS Communications Server: IP Diagnosis Guide*.

---

## Interpreting the workload and LB displays

The output from the `MODIFY advisor_proc,DISPLAY,WORKLOAD,DETAIL` command shows all of the registered members that are mapped to a workload with each member's site and availability as reported by the Agent from the system where the server application resides.

The output from the `MODIFY advisor_proc,DISPLAY,LB,DETAIL` command shows the groups registered by a load balancer with their matching workload. Each member's status is displayed, including member availability and weight information. This status information shows what the Advisor is sending to the load balancer and might not reflect the availability of a member's server application. Member availability depends on several factors as detailed below.

### Load Balancer display for second-tier load balancers

If a group is registered by a second-tier load balancer, the member status in the `MODIFY advisor_proc.DISPLAY,LB,DETAIL` command always matches the actual status of the members in the corresponding `MODIFY advisor_proc,DISPLAY,WORKLOAD,DETAIL` command.

### Load Balancer display for first-tier load balancers

If a group is registered by a first-tier load balancer, the member status in the `MODIFY advisor_proc,DISPLAY,LB,DETAIL` command does not always match the actual status shown in the `MODIFY advisor_proc,DISPLAY,WORKLOAD,DETAIL` command:

- If the members in the group are sysplex distributed DVIPAs or external second-tier load balancers:
  - If the workload is not active to a site, the LB display shows the members of the inactive site with a status of unavailable because the first-tier load balancer cannot route workload connections to this site.
  - If a workload is active only to one site and at least one member on the active site is available, the LB display of each member on the site matches the actual status that is shown in the Workload display.
  - If a workload is active only to one site and no members on the active site are available, the LB display shows all members with a status of available. It ensures that the first-tier load balancer routes new workload connections only to the active site.
  - If the members in the group are sysplex distributed DVIPAs, each DVIPA represents a different set of server applications within the site. Each weight, as shown in the LB display, is relative to the other members of this group.

- If the members in the group are external second-tier load balancers, each second-tier load balancer should be distributing to the same set of server applications with a site. Therefore the weight of each second-tier load balancer within a site is the same value.
- If an Active/Query workload is active to both sites and static routing is configured in the `query_workload_list` statement, the weights of the members are adjusted so that a site's weight which is the sum of all member weights within the site matches the configured percentages.
- If the members in the group are intermediary nodes:
  - If the workload is not active to a site, the LB display shows the members of the inactive site with a status of unavailable because the first-tier load balancer cannot route workload connections to this site.
  - If a workload is active only to one site, the LB display shows all members of the site with a status of available and an equal weight regardless of the actual availability and weight reported by the Agent. This ensures that the first-tier load balancer routes new workload connections to the active site, but does not prefer one member over another within the site. The intermediary node makes the load balancing decision within a site.
  - If an Active/Query workload is active to both sites, the LB display shows all members within a site with the same weight. However, the weights of the two sites, which is the sum of all member weights, might be different. If dynamic routing is configured on the `query_workload_list` statement, the site weights match the site's relative capacity for processing new connections for this workload. If static routing is configured on the `query_workload_list` statement, the site weights match the configured percentages. It allows the first-tier load balancer to route connections for the workload between the sites that are based on the configured routing type. The intermediary node makes the load balancing decision within a site.
  - For an External Intermediary group, the output from this command shows the DVIPAs and ports for the `cross_sysplex_list` entries that are mapped by the intermediary node list. A member is available if a server application is using the `cross_sysplex_list` entry's port on the TCP/IP stack where the entry's DVIPA is active.
  - For an Internal Intermediary group, the output from this command shows the IP address and ports for the `intermediary_node_list` entries. A member is available if all of the following conditions are true:
    - The DVIPA on the mapped `cross_sysplex_list` entry is active on the same TCP/IP stack where the IP address on the `intermediary_node_list` entry is active.
    - A server application that is bound to `INADDR_ANY` or `IN6ADDR_ANY` for IPv6 addresses by using the mapped `cross_sysplex_list` entry's port is on the same TCP/IP stack where the IP address on the `intermediary_node_list` entry is active.
    - No server application is bound to the mapped `cross_sysplex_list` entry's DVIPA and port on the same TCP/IP stack where the IP address on the `intermediary_node_list` entry is active.

If the output from the command indicates that an internal intermediary member is not available, check the `syslogd` file of the Advisor for a warning message to see why the member is not available.

---

## Verifying that the Lifeline Advisor and Agent systems are functioning correctly

View the MVS console and logs of the Lifeline Advisor and Agents to verify that the Lifeline Advisor and Agent systems are functioning correctly.

### About this task

View the MVS console of the Lifeline Advisor and Agent systems after they are started to verify that the applications are started and running. Dump and view the Lifeline Advisor and Agent internal log messages (if the AQSTRACE DD card was specified in the application's started procedure) or view the syslogd files of the Lifeline Advisor and Agent systems to determine whether any error or warning messages were issued.

If there are any failure messages, see Chapter 10, "Multi-site Workload Lifeline messages," on page 113 for the corrective actions that you need to take.

Complete the following steps to verify that the Lifeline Advisors and Lifeline Agents are functioning correctly:

### Procedure

1. Determine whether the Lifeline Advisor is started and connected to the expected external load balancers by issuing the following command on the Lifeline Advisor:

```
MODIFY procname,DISPLAY,LB
```

Verify that each external load balancer is displayed.

2. Determine whether each external load balancer configured and registered the proper groups and members with the Lifeline Advisor.

**Tip:** The Lifeline Advisor does not check for improperly configured members.

- a. After the entire Multi-site Workload Lifeline system is started and running, display all members registered by each external load balancer by issuing the following command:

```
MODIFY procname,DISPLAY,LB,DETAIL
```

This command displays all groups and members that are defined to each of the load balancers. Verify that each member that you expect to be available is flagged as available.

- b. Display all members for each workload by issuing the following command:

```
MODIFY procname,DISPLAY,WORKLOAD,DETAIL
```

Verify that each member that you expect to be available for a workload is flagged as available.

- c. Screen unavailable members for coding errors, such as incorrect IP addresses, ports, or protocols.
3. Determine whether each Lifeline Agent has started correctly and is communicating with the Lifeline Advisor by issuing the following command on each Lifeline Agent:

```
MODIFY procname,DISPLAY,MEMBERS
```

Each registered member that has an IP address owned by the TCP/IP stack where the Lifeline Agent is active will appear in the display output.

4. Determine whether the target server applications for the workload are available for load balancing. On the Lifeline Advisor, issue the following command:

```
MODIFY procname,DISPLAY,WORKLOAD,DETAIL
```

- a. In the display output, check the state for each member defined for this workload. The state is either AVAIL, meaning that the member is available for load balancing, or UNAVAIL, meaning that it is not available for load balancing.
- b. For first-tier external load balancers, to make the member available for load balancing, ensure that either of the following condition is true:
  - The external second-tier load balancers must be started and connected to the Lifeline Advisor.
  - The z/OS sysplex distributor that is acting as a second-tier load balancer must be configured on a z/OS image within the site, and the Lifeline Agent on that z/OS image must be active and communicating with the Lifeline Advisor.

If both of the conditions are false, correct the situation and repeat the display command until you are satisfied that all members that you intend to make available for load balancing are displayed as being available.

- c. For second-tier external load balancers, to make the member available for load balancing, ensure that all of the following conditions are true:
  - The Lifeline Agent must be active on the TCP/IP stack owning the IP address of the member and be communicating with the Lifeline Advisor.
  - The server application must be active.
  - The member must not be quiesced by the Lifeline Agent operator or the external load balancer. The Lifeline Agent is able to quiesce any member that is owned by the TCP/IP stack where the Agent is active. Depending on the external load balancer implementation, the load balancer administrator might quiesce individual members.

If one of the conditions is false, correct the situation and repeat the display command until you are satisfied that all members that you intend to make available for load balancing are displayed as being available.

---

## Diagnosing problems when a workload is not distributed

When a workload is not being distributed to a server application, you can use the information in this topic to diagnose problems.

### About this task

To determine why a workload is not being distributed to a server application, complete the following steps:

### Procedure

1. Determine whether the Advisor is running and that an Agent is running on the MVS system that contains the server application. If they are not running, start the Advisor or Agent.
2. To determine whether any external load balancers have registered the server application, issue the following command on the Lifeline Advisor:

```
MODIFY procname,DISPLAY,LB
```

Verify that at least one first-tier load balancer is connected to the Advisor.

3. Determine whether the `lb_id_list` statement of the Advisor includes the IP address of the load balancer in question.

If you use Application Transparent TLS (AT-TLS) to authenticate the load balancer, verify that the TLS configuration is correct on the load balancer and Advisor. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring AT-TLS.

4. For external first-tier load balancers, determine whether the IP address of the member defined on the load balancer matches the IP address of a second-tier load balancer responsible for load balancing to the server application. If not, correct the definition at the first-tier load balancer.
5. For external second-tier load balancers, determine whether the IP address, port number, and protocol of the member defined on the load balancer match the IP address, port number, and protocol of the server application. If not, correct the definition at the second-tier load balancer.
6. To check the member information on the Lifeline Advisor, issue the following command:

```
MODIFY procname,DISPLAY,LB,DETAIL
```

If the `DISTDVIPA` flag is displayed for the server application, verify that z/OS sysplex distributor is distributing workload requests to the server application. See *z/OS Communications Server: IP Diagnosis* for more information about diagnosing dynamic VIPA and sysplex problems.

7. Determine whether the `agent_id_list` statement of the Advisor contains the IP address and port that the Agent is bound to on the system where the server application exists. If not, correct the `agent_id_list` statement in the Advisor configuration or the `host_connection` statement in the Agent configuration.

If you use Application Transparent TLS (AT-TLS) to authenticate the Agent, verify that the TLS configuration is correct on the Agent and Advisor. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring AT-TLS.

8. To check the member information on the Agent, issue the following command:

```
MODIFY procname,DISPLAY,MEMBERS
```

If the protocol is UDP and the IP address of the server application is a distributed DVIPA address, no workload requests will be distributed for this server application on target TCP/IP stacks. Only the z/OS sysplex distributor TCP/IP stack advertises the DVIPA address, so only server applications running on this TCP/IP stack that binds to the DVIPA for UDP have workload requests distributed to it. Server applications that bind to the distributed DVIPA for protocol UDP on other TCP/IP stacks do not have workload requests distributed to them.

9. Determine whether network connectivity exists between the Advisor and the Agent in question. Unexpected loss of network connectivity between the Advisor and the Agent results in MVS console messages and related messages in the Agent and Advisor logs. To determine which Agents have connected to the Advisor, and by omission, which have not, issue the following Advisor command:

```
MODIFY procname,DISPLAY,ADVISOR
```

10. To determine whether the server application is available and enabled but not quiesced for the workload, issue the following Advisor command:

```
MODIFY procname,DISPLAY,WORKLOAD,DETAIL
```

- a. If the member state is UNAVAIL, correct the issue with the server application.
  - b. If the server application is quiesced, enable the server application by using either of the following commands:
    - If the second-tier load balancer is an external load balancer, issue the MODIFY procname,ENABLE command on the system where the Agent is active.
    - If the second-tier load balancer is z/OS sysplex distributor, issue the VARY TCP,IP,,SYSPLEX,RESUME command on the system where the server application is active.
11. If syslogd was started, check the syslogd file for ERROR or WARNING messages and take the appropriate corrective actions. The syslogd identifier is 11advr for the Advisor and 11agent for the Agent. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and check the internal log for ERROR or WARNING messages and take the appropriate corrective actions. If ERROR and WARNING level log messages are not enabled, enable them and recheck the syslogd file or dump and recheck the internal log messages later.
  12. Determine whether the first-tier load balancer has connectivity to the second-tier load balancer, and the second-tier load balancer has connectivity to the TCP/IP stack owning the IP address of the server application in question.
  13. Issue the following Advisor command to determine whether the workload has been activated to one of the sites:
 

```
MODIFY procname,DISPLAY,WORKLOAD
```

If not, activate the workload by issuing the MODIFY procname,ACTIVATE command.

---

## Diagnosing workload distribution problems

When workload distribution problems occur, you can use the information in this topic to diagnose problems.

### About this task

To diagnose workload distribution problems, complete the following steps:

### Procedure

1. To determine whether a first-tier load balancer has connected to the Lifeline Advisor, issue the following command:

```
MODIFY procname,DISPLAY,LB,DETAIL
```

Ensure that there are groups in the display with the CROSS\_SYSPLEX group flag set, and that the IP addresses listed in those groups are the IP addresses of the second-tier load balancers.

2. Determine whether the update interval value of the Advisor is not abnormally large. The Advisor must wait at least two update intervals before beginning to receive enough data to properly calculate weights when a server application becomes available or when an Agent is started.
  - a. Allow at least three update intervals to expire after a server application is started before re-examining the distribution of workload.



- b. If the workload is occasionally being sent to overloaded server applications, adjust the `update_interval` downward so workload distribution can react more quickly to the pace of new workload requests.
3. To check routing recommendations, periodically issue the following Advisor command to check the weights of members within the group in question.  
`MODIFY procname,DISPLAY,LB,DETAIL`

Determine whether the weights are consistent with the expected behavior. If not, see “`MODIFY advisor_proc,DISplay` command: Display Lifeline Advisor information” on page 69, and “Interpreting the workload and LB displays” on page 37 for more information about how to analyze the server application weights.

4. Determine whether the `agent_id_list` value of the Advisor contains the IP addresses and ports that each Agent is bound to on the MVS systems where the server application exists. If not, correct the `agent_id_list` statement in the Advisor configuration or the `host_connection` statement in the Agent configuration.

If you use Application Transparent TLS (AT-TLS) to authenticate the Agent, verify that the TLS configuration is correct on the Agent and Advisor. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring AT-TLS.

5. Determine whether members of the group in question using this workload are not unexpectedly quiesced or unexpectedly unavailable by issuing the following Advisor command:  
`MODIFY procname,DISPLAY,WORKLOAD,DETAIL`

If the member state is `UNAVAIL`, correct the issue with the server application.

6. If `syslogd` was started, check the `syslogd` file for `ERROR` or `WARNING` messages and take the appropriate corrective actions. The `syslogd` identifier is `lladvr` for the Advisor and `llagent` for the Agent. Otherwise, if the `AQSTRACE DD` card was specified in the Advisor or Agent started procedure, dump and check the internal log for `ERROR` or `WARNING` messages and take the appropriate corrective actions. If `ERROR` and `WARNING` level log messages are not enabled, enable them and recheck the `syslogd` file or dump and recheck the internal log messages later.

---

## Diagnosing problems when the Lifeline Advisor or Agent appears hung

When the Lifeline Advisor or Agent appears hung, you can use the information in this topic to diagnose problems.

### About this task

To diagnose problems when the Lifeline Advisor or Agent appears hung, complete the following steps:

### Procedure

1. To determine whether the Lifeline Advisor or Agent is hung, issue the following command on the system where the Advisor or Agent is running:  
`MODIFY procname,DISPLAY,DEBUG`

If you do not receive a response, attempt to stop the Advisor or Agent instead of canceling the Advisor or Agent. If the Advisor or Agent does not terminate, it might be hung.

2. If the hang occurred when the DEBUG-level Advisor or Agent trace was in effect, collect the problem documentation by taking the following sub-steps and call IBM Service.
  - a. Take an SVC dump of the Agent or Advisor address space (depending on which is hung) and of the OMVS address space including its data spaces.
  - b. Capture the MVS console messages.
  - c. If syslogd was started, capture the Advisor or Agent messages that are written to syslogd. The syslogd identifier is 11advsr for the Advisor and 11agent for the Agent. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and save the internal log messages written to the file specified on the AQSTRACE DD card.
3. If DEBUG-level trace was not in effect at the time, turn on DEBUG-level Advisor or Agent trace, reproduce the problem, collect the problem documentation, and call IBM Service.

---

## Diagnosing problems when the group names are not readable

When the group names are not readable, you can use the information in this topic to diagnose problems.

### About this task

To diagnose problems when the group names are not readable, complete the following steps:

### Procedure

1. Determine whether the group names defined in the load balancers use characters limited to the ASCII character set. When the load balancers define group names, the names are coded in UTF-8 format. This character set is a superset of the EBCDIC character set; not all characters are translatable to EBCDIC.
2. To make the group names readable, rename the group names in the load balancers to use characters limited to the ASCII character set.

---

## Diagnosing problems when load balancer connection terminates

When the external load balancer connection to the Advisor terminates, you can use the information in this topic to diagnose problems.

### About this task

**Guideline:** The Lifeline Advisor has an internal maximum message size of 128K bytes. If this limit is exceeded, the connection with the external load balancer is closed and an error message is logged stating that the message is too large and was not received.

To diagnose problems when the load balancer connection to the Lifeline Advisor terminates unexpectedly, complete the following steps:

### Procedure

1. Determine whether the network administrator has shut down the external load balancer.



2. Determine whether TCP/IP connectivity still exists between the load balancer and the Advisor. For example, from the Advisor system, ping the IP address used by the load balancer.
3. If syslogd was started, check the syslogd file of the Advisor for ERROR or WARNING messages and take the appropriate corrective actions. The syslogd identifier is lladvr for the Advisor. Otherwise, if the AQSTRACE DD card was specified in the Advisor started procedure, dump and check the internal log for ERROR or WARNING messages and take the appropriate corrective actions.
  - a. If an ERROR message which indicates a send() operation failed with errno = EDC8102I Operation would block is issued, you might have registered too many groups or members from the load balancer. Increase the TCPCONFIG TCPSENDBFRSIZE statement in the TCP/IP profile where the Advisor is active, or register fewer groups and members from the load balancer, and then try restarting the external load balancer. For details about the TCPCONFIG statement, see *z/OS Communications Server: IP Configuration Reference*.
  - b. If ERROR and WARNING level log messages are not enabled, enable them, repeat the operation, and recheck the syslogd file or dump and recheck the internal log messages again.
4. Check the load balancer for errors.

---

## Diagnosing problems when the Lifeline Agent connection terminates

When the Agent connection to the Advisor terminates, you can use the information in this topic to diagnose problems.

### About this task

**Guideline:** The Advisor and Agent have an internal maximum message size of 128KB. If this limit is exceeded, the connection is closed and an error message is logged stating that the message is too large and was not received.

If the connection between a Lifeline Agent and Advisor terminates unexpectedly, complete the following steps to diagnose problems:

### Procedure

1. Determine whether the MVS operator has shut down this Agent.
2. Determine whether TCP/IP connectivity still exists between the Agent and the Advisor. For example, from the Advisor system, ping the IP address used by the Agent.
3. If syslogd was started, check the syslogd file of the Advisor for ERROR or WARNING messages and take the appropriate corrective actions. The syslogd identifier is lladvr for the Advisor. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and check the internal log for ERROR or WARNING messages and take the appropriate corrective actions.
  - a. If an ERROR message which indicates a send() operation failed with errno = EDC8102I Operation would block is issued, you might have registered too many groups or members that belong to the same Agent. Increase the TCPCONFIG TCPSENDBFRSIZE statement in the TCP/IP profile where the Advisor is active, or register fewer groups and members belonging to the Agent, and then try restarting the Agent. For details about the TCPCONFIG statement, see *z/OS Communications Server: IP Configuration Reference*.

- b. If ERROR and WARNING level log messages are not enabled, enable them, repeat the operation, and recheck the syslogd file or dump and recheck the internal log messages again.

---

## Diagnosing problems when the Lifeline Advisor to Advisor connection terminates

When the connection between the peer Lifeline Advisor and this Advisor terminates unexpectedly, you can use the information in this topic to diagnose problems.

### About this task

To diagnose problems when the Advisor to Advisor connection terminates, complete the following steps:

### Procedure

1. Determine whether the MVS operator has shut down the peer Advisor.
2. Determine whether TCP/IP connectivity still exists between the peer Advisor and the Advisor. For example, from the Advisor system, ping the IP address used by the peer Advisor.
3. If syslogd was started, check the syslogd file of the Advisor for ERROR or WARNING messages and take the appropriate corrective actions. The syslogd identifier is `lladvsr` for the Advisor. Otherwise, if the AQSTRACE DD card was specified in the Advisor started procedure, dump and check the internal log for ERROR or WARNING messages and take the appropriate corrective actions.
4. If syslogd was started, check the syslogd file of the peer Advisor for ERROR or WARNING messages and take the appropriate corrective actions. Otherwise, if the AQSTRACE DD card was specified in the peer Advisor started procedure, dump and check the internal log for ERROR or WARNING messages and take the appropriate corrective actions.

---

## Diagnosing failures of registering with ARM

When the Lifeline Advisor or Agent fails to register with the Automatic Restart manager (ARM), you can use the information in this topic to diagnose problems.

### About this task

To diagnose problems when the Lifeline Advisor or Agent fails to register with ARM, complete the following step:

### Procedure

Check the warning-level message written to the syslogd file. This log message is issued when the IXCARM call fails with the return code and the reason code indicated in the log message. See *z/OS MVS Programming: Sysplex Services Reference* for information about interpreting the IXCARM return code and reason code. One of the common causes of failure is the lack of a security profile. See Chapter 3, "Configuring Multi-site Workload Lifeline," on page 17 for information about how to add an ARM security profile for the Advisor or Agent.

---

## Chapter 6. Multi-site Workload Lifeline configuration statements

Multi-site Workload Lifeline configuration statements define the information needed to establish communication with an Advisor and external load balancers, an Advisor and Agents, and between peer Advisors.

Two types of Multi-site Workload Lifeline configuration statements are: Lifeline Advisor configuration statements and Lifeline Agent configuration statements.

General configuration rules for the Multi-site Workload Lifeline are as follows:

- You must specify at least one value for each statement and separate the statement from its values by using one or more blanks.
- You can specify only one statement and one or more values per line.
- Text beyond the specified statement and its values is treated as a comment. If the text does not start with a number sign (#), a warning message is written to the log.
- For statements that contain braces ({ and }), you must specify each brace on a separate line, for example:

```
advisor_id_list
{
 10.10.10.1
 10.10.10.2
}
```

- Any text beyond an opening or closing brace is treated as a comment. If the text does not start with a number sign (#), a warning message is written to the log.
- Text beginning with a number sign (#) is a comment and is ignored. The remainder of the line following the number sign (#) is considered part of the comment.
- For statements with identical labels, a warning message is written to the log, and the last instance of the statement is used.
- When a statement is processed, all of the parameters are examined. Any parameter that is specified incorrectly causes an error. Any inconsistencies between parameters also cause an error.
- Static system symbols can be used for values in a statement. For more information about defining symbols, see *z/OS MVS Initialization and Tuning Reference*.

---

### Lifeline Advisor configuration statements

Use the following configuration statements to configure Lifeline Advisors.

Table 1. Lifeline Advisor Configuration Statements

| Configuration statement | Allowed values | Default value | Required or optional | Purpose                                                                                           |
|-------------------------|----------------|---------------|----------------------|---------------------------------------------------------------------------------------------------|
| advisor_connection_port | 1 - 65535      | None          | Required             | Specifies the port on which the primary Advisor listens for connections from a secondary Advisor. |
| advisor_id_list         |                | None          | Optional             | Specifies which secondary Advisors are allowed to connect to the primary Advisor.                 |

Table 1. Lifeline Advisor Configuration Statements (continued)

| Configuration statement    | Allowed values        | Default value                                                                                                               | Required or optional                            | Purpose                                                                                                                                                                        |
|----------------------------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| advisor_takeover_policy    | automatic<br>manual   | manual                                                                                                                      | Optional                                        | Specifies the action that a secondary Advisor takes when it determines that a primary Advisor has stopped.                                                                     |
| advisor_timeout            | 10 - 600 (in seconds) | 10                                                                                                                          | Optional                                        | Specifies how often the Advisor checks the availability of the peer Advisor.                                                                                                   |
| agent_connection_port      | 1 - 65535             | None                                                                                                                        | Required                                        | Specifies the port on which the primary Advisor listens for connections from Agents.                                                                                           |
| agent_id_list              |                       | None                                                                                                                        | Required                                        | Specifies which Agents are allowed to connect to the primary Advisor.                                                                                                          |
| cross_sysplex_list         |                       | None                                                                                                                        | Required                                        | Specifies the mapping of second-tier load balancers and their respective site name for a specific workload, and the failure detection interval for the workload.               |
| debug_level                | 0 - 255               | 7                                                                                                                           | Optional                                        | Specifies the level of debug information that is logged.                                                                                                                       |
| failure_detection_interval | 10 - 600 (in seconds) | 60                                                                                                                          | Optional                                        | Specifies the interval that the primary Advisor waits before determining a site failure.                                                                                       |
| intermediary_node_list     |                       | None                                                                                                                        | Optional                                        | Specifies the mapping of intermediary nodes and their respective site name for a specific workload.                                                                            |
| lb_connection_v4           |                       | None                                                                                                                        | Required (if lb_connection_v6 is not specified) | Specifies the IPv4 address and port on which the primary Advisor listens for connections from external load balancers.                                                         |
| lb_connection_v6           |                       | None                                                                                                                        | Required (if lb_connection_v4 is not specified) | Specifies the IPv6 address and port on which the primary Advisor listens for connections from external load balancers.                                                         |
| lb_id_list                 |                       | None                                                                                                                        | Required                                        | Specifies which external load balancers are allowed to connect to the primary Advisor.                                                                                         |
| peer_advisor_id            |                       | The IPv4 address on the lb_connection_v4 statement or, if not specified, the IPv6 address on the lb_connection_v6 statement | Optional                                        | Specifies the IP address on the primary Advisor that the secondary Advisor uses to connect to.                                                                                 |
| query_workload_list        |                       | None                                                                                                                        | Optional                                        | Specifies the Active/Query workload, its associated Active/Standby workload, and the distribution method for the Active/Query workload.                                        |
| update_interval            | 10 - 600 (in seconds) | 10                                                                                                                          | Optional                                        | Specifies how frequently the Agents update the primary Advisor with new information.                                                                                           |
| workload_switch_policy     | automatic<br>manual   | manual                                                                                                                      | Optional                                        | Specifies the action that the primary Advisor takes when it determines either the workload is unavailable on the active site or the active site for a workload is unavailable. |

## advisor\_connection\_port

Use the `advisor_connection_port` statement to specify the port that the primary Advisor should listen on for connections from a secondary Advisor.

## Syntax

►—`advisor_connection_port`—`host_port`—►

## Parameters

*host\_port*

Specifies which port the primary Advisor listens on for connections from a secondary Advisor. The valid range of port values is 1 - 65535.

**Requirement:** This port number must match the port number specified in the `advisor_connection_port` configuration statement for the secondary Advisor.

## Usage

**Restriction:** Do not specify the same port that is on the `agent_connection_port`, `lb_connection_v4`, or `lb_connection_v6` configuration statements; otherwise, the secondary Advisor will connect to the primary Advisor's socket that is used for processing Agent connections or load balancer connections.

## advisor\_id\_list

Use the `advisor_id_list` statement to specify which secondary Advisors are allowed to connect to the primary Advisor. This list is also used by the secondary Advisor to select a source IP address when it is connecting to the primary Advisor.

## Syntax

►—`advisor_id_list`{  
    ↓  
    —`advisor_ipaddr`—  
}—►

## Parameters

*advisor\_ipaddr*

Specifies a list of secondary Advisors that are allowed to connect to the primary Advisor. The list consists of one or more blank-delimited IP address entries, each specified on a separate line and enclosed in braces. Each of these entries represents the IP address of a given secondary Advisor.

**Requirement:** Only complete IPv4 or IPv6 addresses are accepted. Host names, prefixes, or subnets are not allowed. The IPv4 `INADDR_ANY` address (0.0.0.0) and the IPv6 unspecified address (`::`) are not allowed. Each `advisor_ipaddr` entry must be specified on one line. The `advisor_ipaddr` entry cannot be continued to a subsequent line.

## Usage

- You can dynamically update this statement to add or delete IP address entries by using the `MODIFY procname, REFRESH` command. If the secondary Advisor is connected, the entry for that Advisor cannot be deleted.
- For high availability, use a static VIPA as the local IP address to tolerate individual link outages on the z/OS system.

## Requirements:

- Do not use `VIPARANGE` dynamic VIPA.

- You must configure a local IP address for the primary Advisor in this list because it is used during initialization by the primary Advisor to determine whether another primary Advisor is currently active.

Configuring the IP address for the peer Advisor in this list is optional. However, if you do not configure an Application Transparent TLS (AT-TLS) policy to permit Advisor to Advisor communication, the statement is required; otherwise, the peer Advisor cannot connect to this Advisor.

You can configure peer Advisor IP addresses in this statement as well as have an AT-TLS policy enabled, such that a peer Advisor connection is authenticated by using this statement, while a different peer Advisor connection is authenticated by using AT-TLS.

## advisor\_takeover\_policy

Use the `advisor_takeover_policy` statement to specify the action that the secondary Advisor should take when it determines that the primary Advisor has stopped.

### Syntax



### Parameters

#### manual

Configures the secondary Advisor to wait for a `MODIFY procname, TAKEOVER` command before taking over as the primary Advisor. The default value is `manual`.

#### automatic

Configures the secondary Advisor to perform a takeover to become the primary Advisor.

### Usage

If automation is already in place to detect a primary Advisor failure, specifying `manual` will allow automation procedures to handle the takeover of the primary Advisor.

**Rule:** Keep the configuration files of the primary and secondary Advisor in sync; otherwise, the automatic takeover will not occur even if the automatic parameter is specified.

## advisor\_timeout

Use the `advisor_timeout` statement to specify how often the Advisor checks the availability of the peer Advisor.

### Syntax



## Parameters

### *interval*

Specifies how frequently, in seconds, the Advisor checks the availability of the peer Advisor.

The valid range is 10 – 600 (in seconds). The default value is 10 seconds.

The configuration statement is used by the primary Advisor for the following reasons:

- During initialization to determine how long it waits before concluding that another primary Advisor is not active before becoming the primary Advisor.
- To determine how long to wait for the secondary Advisor to signal that it is available before declaring that the secondary Advisor is no longer active.

The configuration statement is used by the secondary Advisor for the following reason:

- To determine how long to wait for the primary Advisor to signal that it is available before declaring that the primary Advisor is no longer active.

## agent\_connection\_port

Use the `agent_connection_port` statement to specify the port on which the primary Advisor should listen for connections from Agents.

### Syntax

►►—agent\_connection\_port—host\_port—————►►

## Parameters

### *host\_port*

Specifies the port on which the primary Advisor listens for connections from Agents. The valid range of port values is 1 - 65535.

**Requirement:** This port number must match the port number specified in the `advisor_id` configuration statement for the Agents.

### Usage

**Restriction:** Do not specify the same port that is on the `advisor_connection_port`, `lb_connection_v4`, or `lb_connection_v6` configuration statement; otherwise, the Agent will connect to the primary Advisor's socket that is used for processing secondary Advisor connections or load balancer connections.

## agent\_id\_list

Use the `agent_id_list` statement to specify which Agents are allowed to connect to the primary Advisor.

### Syntax

►►—agent\_id\_list—{—agent\_ipaddr..agent\_port—}—————►►

## Parameters

*agent\_ipaddr..agent\_port*

Specifies a list of Agents that are allowed to connect to the primary Advisor. The list consists of one or more blank-delimited IP address and port pairs, each specified on a separate line and enclosed in braces. Each of these pairs represents the IP address and port of a given Agent. The valid range of port values is 1 - 65535. Do not put any spaces between the IP address, the two periods (..), and the port.

### Requirements:

- Only complete IPv4 or IPv6 addresses are accepted. Host names, prefixes, or subnets are not allowed. The IPv4 INADDR\_ANY address (0.0.0.0) and the IPv6 unspecified address (::) are not allowed. Each *agent\_ipaddr..agent\_port* pair must be specified on one line; it cannot be continued to a subsequent line.
- Each IP address and port pair must match the IP address and port in the *host\_connection* configuration statement for an Agent.

## Usage

If an Agent attempts to connect to the Advisor and the Agent's source IP address and port are not represented in this list, the connection is refused.

**Guideline:** You can configure this statement as well as have an AT-TLS policy enabled, such that some Agent connections are authenticated only by using this statement, while other Agent connections are also authenticated by using AT-TLS.

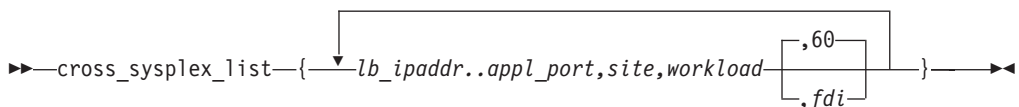
You can dynamically update this statement to add or delete IP address and port pair entries by using the MODIFY procname, REFRESH command. If an Agent is connected, the entry for that Agent cannot be deleted.

## cross\_sysplex\_list

Use the *cross\_sysplex\_list* statement to specify the IP address and site name of each second-tier load balancer, the port of the application group used by the workload, the workload name, and the failure detection interval for the workload.

If a first-tier load balancer attempts to connect to the primary Advisor and register group members that are not represented in this list or in the *intermediary\_node\_list* configuration statement, the connection is refused.

## Syntax



## Parameters

*lb\_ipaddr..appl\_port,site,workload,fdi*

Specifies a list of second-tier load balancers, the site the load balancer resides on, and the workload the load balancer is responsible for. The list consists of one or more blank-delimited IP address, port, site name, workload name, and workload failure detection interval 5-tuples, each specified on a separate line



and enclosed in braces. Each of these 5-tuples represents the second-tier load balancer and the mapping of the site name and workload name for that workload. The valid range of port values is 1 - 65535.

**Requirements:**

- Only complete IPv4 or IPv6 addresses are accepted. Host names, prefixes, or subnets are not allowed. The IPv4 INADDR\_ANY address (0.0.0.0) and the IPv6 unspecified address (::) are not allowed.
- Each *lb\_ipaddr.appl\_port,site,workload,fdi* 5-tuple must be specified on one line; it cannot be continued to a subsequent line.
- Do not put any spaces between the IP address, the two periods (.), the port, the comma (,), the site name, the comma (,), the workload name, and, if specified, the comma (,) and the failure detection interval.

Each entry can represent either an Active/Standby workload or an Active/Query workload.

**lb\_ipaddr.appl\_port**

Specifies one or more blank-delimited IP address and port of second-tier load balancers.

**site**

Specifies the site where the second-tier load balancer resides. The site name corresponds to the MVS sysplex name for that site.

**workload**

Specifies the workload the load balancer is responsible for. The workload name can consist of alphanumeric characters as well as the @, #, \$, -, and \_ characters. The first character must be an alphabetic character. The length of the workload name cannot exceed 64 characters.

**Requirement:** Each workload in the list must specify the same two unique site names. All workloads must use the same two names.

**fdi**

Specifies the workload failure detection interval. The failure detection interval specifies how long the Advisor waits for determining that a workload is no longer available on a site. Although a workload might consist of multiple load balancer application groups, the failure detection interval starts when no member of one group is available for that site. The failure detection interval will reset if at least one of the members of the failing application group becomes available for that site. The valid range is 10 - 600 in seconds. The default interval is 60 seconds. The failure detection interval value cannot be less than the value that is specified on the *update\_interval* statement. All entries in this list for the same workload must specify the same interval value; otherwise, a terminating error occurs.

**Usage**

- The second-tier load balancer IP address can be either the IP address of the external load balancer residing in the site, or the dynamic virtual IP address (VIPA) that is distributed by the z/OS sysplex distributor residing on a system image in the site.
- If a workload consists of multiple application groups, each application group must be specified with its own 5-tuple entry, and must be unique with other 5-tuple entries that are defined for the workload by specifying a different second-tier load balancer IP address or a different port.

- You can dynamically update this statement by using the MODIFY *procname*, REFRESH command.

**Rules:**

- A new 5-tuple entry can be added to an existing workload or for a new workload.
- An existing 5-tuple entry for a workload cannot be deleted.
- The workload name and failure detection interval are the only values that can be modified on an existing 5-tuple entry. The workload name cannot be modified unless the workload is quiesced. If the workload name is also defined in an intermediary\_node\_list entry, all cross\_sysplex\_list and intermediary\_node\_list entries using this workload name must be modified.

## debug\_level

Use the debug\_level statement to specify the level of debug information that is logged.

### Syntax



### Parameters

*level*

Specifies the debug level. If the AQSTRACE DD card was specified in the Advisor started procedure, all log messages are written to internal memory, but only log messages at the ERROR, WARNING, and EVENT level are written to syslogd. If the AQSTRACE DD card was not specified, all log messages are written to syslogd. The level value represents a particular debug level or combination of debug levels. See “Debug levels” on page 35 for the possible values. The default level is 7 (1 + 2 + 4 = 7), which means that all error, warning, and event messages are captured. The valid range is 0 – 255.

### Usage

- You can dynamically update this statement by using the MODIFY *procname*, DEBUG command.
- To log a combination of debug levels, add the debug level numbers.

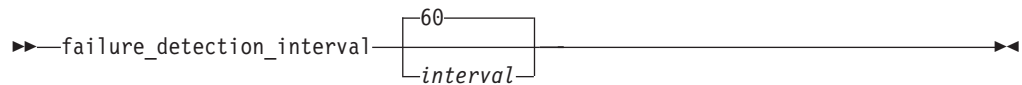
**Restriction:** Do not customize this statement unless you are directed to do so by an IBM Service representative. Adding additional types of trace data can cause the amount of data captured to become voluminous. Reducing the amount of trace data from the default might make diagnosing a problem more difficult.

## failure\_detection\_interval

Use the failure\_detection\_interval statement to specify how long the primary Advisor waits for determining that a site is no longer available.

For workload failures, although a workload might consist of multiple load balancer application groups, the failure detection interval starts when all members of one group are not available for that site. The failure detection interval resets if at least one member of the failing application group becomes available for that site.

## Syntax



## Parameters

### *interval*

Specifies how long the primary Advisor waits for an indication that a site is available. The valid range is 10 – 600 in seconds. The default interval is 60 seconds.

**Requirement:** The *interval* value cannot be less than the value specified on the *update\_interval* statement.

## Usage

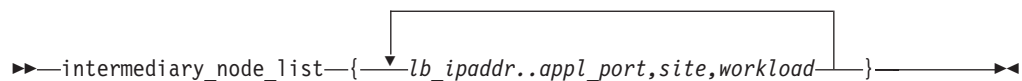
You can dynamically update this statement by using the `MODIFY procname,REFRESH` command.

## intermediary\_node\_list

Use the *intermediary\_node\_list* statement to specify the IP address and site name of each intermediary node, the ports of the load balancer application group used by the workload, and the workload name.

If a first-tier load balancer attempts to connect to the primary Advisor and register group members that are not represented in this list or in the *cross\_sysplex\_list* configuration statement, the connection is refused.

## Syntax



## Parameters

### *lb\_ipaddr..appl\_port,site,workload*

Specifies a list of intermediary nodes, the site that the intermediary node resides on, and the workload that the intermediary node is responsible for. The list consists of one or more blank-delimited IP address, port, site name, and workload name 4-tuples, each specified on a separate line and enclosed in braces. Each of these 4-tuples represents the intermediary node and the mapping of the site name and workload name for that workload. The valid range of port values is 1 - 65535.

### Requirements:

- Only complete IPv4 or IPv6 addresses are accepted. Host names, prefixes, or subnets are not allowed. The IPv4 INADDR\_ANY address (0.0.0.0) and the IPv6 unspecified address (::) are not allowed.
- Each *lb\_ipaddr..appl\_port,site,workload* 4-tuple must be specified on one line; it cannot be continued to a subsequent line.

- Do not put any spaces between the IP address, the two periods (.), the port, the comma (,), the site name, the comma (,), and the workload name.

**lb\_ipaddr..appl\_port**

Specifies one or more blank-delimited IP address and port of intermediary nodes.

**site**

Specifies the site where the intermediary node resides. The site name corresponds to the MVS sysplex name for that site.

**workload**

Specifies the workload that the intermediary node is responsible for. The workload name can consist of alphanumeric characters as well as the @, #, \$, -, and \_ characters. The first character must be an alphabetic character. The length of the workload name must be within 64 characters.

**Requirements:**

- Each workload in the list must specify the same two unique site names. All workloads must use the same two names.
- If a workload consists of multiple application groups, each application group must be specified with its own 4-tuple entry, and must be unique with other 4-tuple entries that are defined for the workload by specifying a different intermediary node IP address or a different port.

**Usage**

- The intermediary node IP address resides in the site. It uses its own recommendations rather than receive distribution recommendations from the Multi-site Workload Lifeline.
- You can dynamically update this statement by using the MODIFY *procname*,REFRESH command.

**Rules:**

- A new 4-tuple entry can be added to an existing workload or for a new workload.
- An existing 4-tuple entry for a workload cannot be deleted.
- The workload name is the only value that can be modified on an existing 4-tuple entry. The workload name cannot be modified unless the workload is quiesced.
- If the workload is also defined in a cross\_sysplex\_list entry, all intermediary\_node\_list and cross\_sysplex\_list entries that are using this workload name must be modified.

**Requirement:** A load balancer application group that maps to entries in this list must have corresponding entries in the cross\_sysplex\_list configuration statement.

- If a workload has at least one intermediary IP address that matches an IP address configured in the site, then each intermediary\_node\_list entry for that workload must have a corresponding cross\_sysplex\_list entry that has a matching workload name, site, and port.
- If a workload has no intermediary IP address that matches an IP address configured in the site, then each intermediary\_node\_list entry for that workload must have a corresponding cross\_sysplex\_list entry that has a matching workload name and site.

These corresponding entries are identified by using the same workload name and site name, but the IP addresses in the `cross_sysplex_list` represent the distributable DVIPAs. The z/OS sysplex distributor residing within each site advertises these VIPAs.

## lb\_connection\_v4

Use the `lb_connection_v4` statement to specify the IPv4 address and port that the primary Advisor should listen on for connections from external load balancers.

This statement is optional. However, if neither a `lb_connection_v4` nor `lb_connection_v6` statement is present in the configuration file, a terminating error occurs.

### Syntax

```
▶▶ lb_connection_v4 host_ipaddr [..3860
 [..host_port]
```

### Parameters

*host\_ipaddr..host\_port*

Specifies which IPv4 address, and optionally, the port, on which the primary Advisor listens for IPv4 connections from an external load balancer. This IP address and port must be coordinated on any load balancers that will connect to this Advisor. The port is optional. The default value is 3860. The valid range of port values is 1 - 65535.

**Rule:** If you specify the port, do not use spaces between the IP address, the two periods (..), and the port.

**Requirement:** Only a complete IPv4 address is accepted. Host names, prefixes, or subnets are not allowed. The IPv4 INADDR\_ANY address (0.0.0.0) is not allowed.

### Usage

- If you specify this statement, you must specify at least one IPv4 address in the `lb_id_list` statement; otherwise, a terminating error occurs.
- Define the IPv4 address as a VIPARANGE dynamic VIPA. This allows external load balancers and Agents to reconnect to this IP address when the secondary Advisor takes over as the primary Advisor and moves the dynamic VIPA to the host on which the secondary Advisor is active.
- You can dynamically update this statement to add, delete, or modify the IP address and port pair entry on the secondary Advisor by using the `MODIFY procname,REFRESH` command.

#### Rules:

- If the secondary Advisor is using this entry to connect to the primary Advisor, you cannot delete or modify the entry.
- You cannot dynamically update this statement on the primary Advisor.

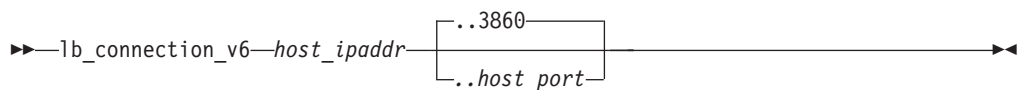
**Restriction:** Do not specify the same port that is on the `advisor_connection_port` or `agent_connection_port` configuration statements; otherwise, the Agents and secondary Advisor will connect to the primary Advisor's socket that is used for processing load balancer connections.

## lb\_connection\_v6

Use the `lb_connection_v6` statement to specify the IPv6 address and port that the primary Advisor should listen on for connections from external load balancers.

This statement is optional. However, if neither a `lb_connection_v4` nor `lb_connection_v6` statement is present in the configuration file, a terminating error occurs.

### Syntax



### Parameters

*host\_ipaddr..host\_port*

Specifies which IPv6 address, and optionally the port, that the primary Advisor listens on for IPv6 connections from an external load balancer. This IP address and port must be coordinated on any load balancers that will connect to this Advisor. The port is optional. The default value is 3860. The valid range of port values is 1 - 65535.

**Rule:** If you specify the port, do not use spaces between the IP address, the two periods (..), and the port.

**Requirement:** Only a complete IPv6 address is accepted. Host names, prefixes, or subnets are not allowed. The IPv6 unspecified address (::) is not allowed.

### Usage

- If this statement is specified, you must specify at least one IPv6 address in the `lb_id_list` statement; otherwise, a terminating error occurs.
- Define the IPv6 address as a VIPARANGE dynamic VIPA. This allows external load balancers and Agents to reconnect to this IP address when the secondary Advisor takes over as the primary Advisor and moves the dynamic VIPA to the host on which the secondary Advisor is active.
- You can dynamically update this statement to add, delete, or modify the IP address and port pair entry on the secondary Advisor by using the `MODIFY procname,REFRESH` command.

#### Rules:

- If the secondary Advisor is using this entry to connect to the primary Advisor, you cannot delete or modify the entry.
- You cannot dynamically update this statement on the primary Advisor.

**Restriction:** Do not specify the same port that is on the `advisor_connection_port` or `agent_connection_port` configuration statements; otherwise, the Agents and secondary Advisor will connect to the primary Advisor's socket that is used for processing load balancer connections.

## lb\_id\_list

Use the `lb_id_list` statement to specify which external load balancers are allowed to connect to the primary Advisor.

### Syntax

```
▶▶ lb_id_list { lb_ipaddr }
```

### Parameters

#### *lb\_ipaddr*

Specifies a list of external load balancers that are allowed to connect to the primary Advisor. The list consists of one or more blank-delimited IP address entries, each specified on a separate line and enclosed in braces. Each of these entries represents the IP address of a given load balancer.

**Requirement:** Only complete IPv4 or IPv6 addresses are accepted. Host names, prefixes, or subnets are not allowed. The IPv4 INADDR\_ANY address (0.0.0.0) and the IPv6 unspecified address (::) are not allowed. You must specify each `lb_ipaddr` entry on one line; it cannot be continued to a subsequent line.

### Usage

- If an external load balancer attempts to connect to the primary Advisor and the load balancer's source IP address is not represented in this list, the connection is refused.

**Guidelines:** You can configure this statement as well as have an AT-TLS policy enabled, such that some external load balancer connections are authenticated only by using this statement, while other load balancer connections are also authenticated by using AT-TLS.

- You can dynamically update this statement to add or delete IP address entries by using the `MODIFY procname, REFRESH` command. If a load balancer is connected, you cannot delete the entry for that load balancer.
- You must configure all external load balancers, both first-tier and second-tier, in this list. If a z/OS sysplex distributor is acting as a second-tier load balancer, do not configure it in this list.

**Rule:** If you specify an IPv4 address, you must specify the `lb_connection_v4` statement or a terminating error occurs. Similarly, if you specify an IPv6 address, you must specify the `lb_connection_v6` statement or a terminating error occurs.

## peer\_advisor\_id

Use the `peer_advisor_id` statement to specify the IP address of the primary Advisor that this secondary Advisor uses to communicate.

This statement is optional. If you do not specify the statement, it defaults to either the IPv4 address specified on the `lb_connection_v4` statement, if configured, or the IPv6 address specified on the `lb_connection_v6` statement.

## Syntax

►►—`peer_advisor_id—advisor_ipaddr`—►►

## Parameters

*advisor\_ipaddr*

Specifies the IPv4 or IPv6 address which the Advisor, when acting as the secondary Advisor, uses as the destination IP address to connect to the primary Advisor.

### Requirements:

- Only a complete IPv4 or IPv6 address is accepted. Hostnames, prefixes, or subnets are not allowed. The IPv4 INADDR\_ANY address (0.0.0.0) and the IPv6 unspecified address (::) are not allowed.
- The IP address must match either the IPv4 address specified on the `lb_connection_v4` configuration statement or the IPv6 address specified on the `lb_connection_v6` configuration statement for the primary Advisor.

## Usage

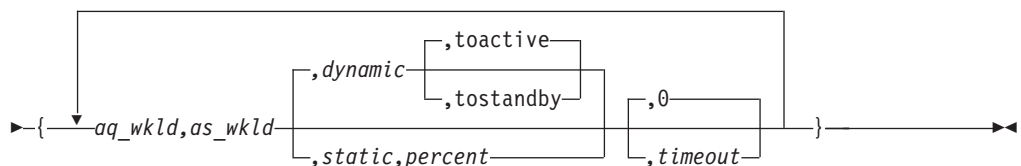
You can dynamically update this statement only on the primary Advisor by using the `MODIFY procname,REFRESH` command. You cannot dynamically update this statement on the secondary Advisor.

## query\_workload\_list

Use the `query_workload_list` statement to specify the associated Active/Standby workload for an Active/Query workload, the distribution type and options for this Active/Query workload, and the lifetime for persistent connections for this workload.

## Syntax

►►—`query_workload_list`—►►



## Parameters

*aq\_wkld, as\_wkld, disttype, distoption, timeout*

Specifies the Active/Query workload, its associated Active/Standby workload,



the distribution type, the distribution-specific option, and the timeout value before a persistent connection for the Active/Query workload is reset. The list consists of one or more blank-delimited Active/Query workload names, associated Active/Standby workload names, distribution type, distribution option, and timeout 5-tuples, each specified on a separate line and enclosed in braces.

**Requirements:**

- Each *aq\_wkld,as\_wkld,disttype,distoption,timeout* 5-tuple must be specified on one line; it cannot be continued to a subsequent line.
- Do not put any spaces between the Active/Query workload, the comma (,), the Active/Standby workload name, the comma (,), the distribution type, and, if specified, the comma (,) and the distribution option, and if specified, the comma (,) and the timeout.

**aq\_wkld,as\_wkld**

Specifies the Active/Query workload and its associated Active/Standby workload. The workload names can consist of alphanumeric characters as well as the @, #, \$, -, and \_ characters. The first character must be an alphabetic character. The length of each workload name cannot exceed 64 characters.

**Requirement:** The Active/Query and Active/Standby workloads must also be defined in the *cross\_sysplex\_list* statement.

**Rules:**

- An Active/Query workload can be associated with only a single Active/Standby workload.
- An Active/Standby workload can have, at most, two Active/Query workloads associated with it.

**disttype/distoption**

Specifies the distribution type and the distribution-specific option. The valid Active/Query workload distribution types are either dynamic or static, with the default being dynamic.

**dynamic**

For the dynamic distribution type, the possible distribution options are **toactive** and **tostandby**. The option **toactive** indicates to gradually favor the same site where the associated Active/Standby workload is active as database replication latency increases. The option **tostandby** indicates to gradually favor the same site where the associated Active/Standby workload is standby as database replication latency increases.

**static**

For the static distribution type, the distribution option is the percentage, in the range 1 - 99, of new workload connections that are distributed to the active site with the remaining new workload connections that are distributed to the standby site.

**timeout**

Specifies the timeout value. The timeout value is the elapsed time that an Active/Query workload connection remains established before the connection is reset. The valid range of timeout values, in seconds, is 0 - 3600. The default value is 0, which indicates that persistent Active/Query workload connections are never reset.

## Usage

You can dynamically update this statement to add, delete, or modify 5-tuple entries for an existing or a new Active/Query workload by using the `MODIFY procname,REFRESH` command.

### Rules:

- A new 5-tuple entry cannot be added or an existing 5-tuple entry cannot be deleted unless both the Active/Standby and Active/Query workloads are quiesced.
- The distribution type for an existing 5-tuple entry cannot be modified unless the Active/Query workload is quiesced.
- The distribution option and timeout value for an existing 5-tuple entry can be modified without quiescing the Active/Standby and Active/Query workloads.

## update\_interval

Use the `update_interval` statement to specify how often Agents update the primary Advisor with new information. You can also use this statement to determine how often the Advisor queries the status of each of the systems in both sites using BCPii communication.

The lower the update interval is, the more up-to-date the recommendations provided to the external load balancer will be with respect to the target's availability and capability to handle additional workload requests. However, the lower the update interval is, the higher the network traffic and CPU overhead are.

Depending on how the external load balancers are configured and implemented, the `update_interval` statement might also determine how often the external load balancer is updated with data from the primary Advisor. If the external load balancer supports the SASP push flag, and if the flag is set in the load balancer, the primary Advisor sends recommendations to the load balancer at least every update interval. Regardless of what value is set for the update interval, if the push flag is supported and configured in the load balancer, the Advisor might update the load balancer with recommendations before the update interval expires. Events that can trigger an earlier update include starting or stopping a target server application, or the addition or deletion of a member's IP address on the Agent host.

The update interval is a key factor in determining the latency period between when changes occur on the target system and when the load balancer is informed of them. Each Agent updates the primary Advisor with new information every update interval. The Advisor, in turn, updates the load balancer with changes in recommendations every update interval, if the load balancer supports the push flag. If the push flag is supported and configured in the load balancer, the Advisor updates the load balancer with any changes in the availability status of the target system and server application when it discovers such a change from the Agent, instead of waiting for the update interval to expire.

When the external load balancer supports and is configured for the push flag, the maximum amount of latency expected between a change in the member's recommendation and when the load balancer is informed of it, is twice the value of the update interval: one update interval for the Agent to report it to the primary Advisor, and one update interval for the Advisor to report it to the load balancer. However, on average, it takes about one update interval for a change in the target server application's recommendation to reach the load balancer.

## Syntax



## Parameters

### *interval*

Specifies how frequently Agents update the primary Advisor with new information. At each interval, all Agents update the primary Advisor with the following status information for each registered member, which is the application server that the Agent is responsible for:

- Whether the target server application is active or inactive
- Whether the operator quiesced the target server application
- Various metrics that measure the target system
- The ability of the target server application to handle additional workload requests

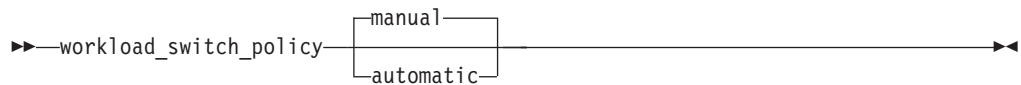
The valid range is 10 – 600 in seconds. The default interval is 10 seconds.

**Requirement:** The *interval* value cannot be greater than the value specified on the `failure_detection_interval` statement or the *fdi* value on an entry on the `cross_sysplex_list` statement.

## workload\_switch\_policy

Use the `workload_switch_policy` statement to specify the action that the primary Advisor should take when it determines either that a workload is no longer available on the active site or the active site for a workload is unavailable.

## Syntax



## Parameters

### **manual**

Configures the primary Advisor to wait for a `MODIFY procname,ACTIVATE` command before redistributing the workload to the alternate site. The default policy is manual.

### **automatic**

Configures the primary Advisor to activate the redistribution of the workload to the alternate site. This setting is ignored if no Agents for a site is active because there is no way to communicate with the site to deactivate the existing connections.

## Usage

If automation is already in place to detect a workload or site failure, specifying manual will allow automation procedures to handle the redistribution of the workload to the alternate site.

## Lifeline Agent configuration statements

Use the following configuration statements to configure Lifeline Agents.

Table 2. Lifeline Agent Configuration Statements

| Configuration Statement | Allowed values | Default Value | Required/Optional                             | Purpose                                                                                                   |
|-------------------------|----------------|---------------|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------|
| advisor_id              |                | None          | Required, if advisor_id_list is not specified | Specifies the IP address and port of the primary Advisor that the Agent connects to.                      |
| advisor_id_list         |                | None          | Required, if advisor_id is not specified      | Specifies the list of IP address and port pairs of the primary Advisors that the Agent connects to.       |
| debug_level             | 0 - 255        | 7             | Optional                                      | Specifies the level of debug information that is logged.                                                  |
| host_connection         |                | None          | Required                                      | Specifies the local IP address and port that the Agent binds to before connecting to the primary Advisor. |

### advisor\_id

Use the `advisor_id` statement to specify the IP address and port of the primary Advisor that this Agent communicates with.

This statement is optional. However, if neither an `advisor_id_list` nor `advisor_id` statement is present in the configuration file, a terminating error occurs. If this statement is specified, the `advisor_id_list` statement cannot be specified, or a terminating error occurs.

#### Syntax

►►—`advisor_id—advisor_ipaddr..advisor_port`—◀◀

#### Parameters

*advisor\_ipaddr..advisor\_port*

Specifies the IP address and port of the primary Advisor that this Agent communicates with. The IP address must match either the `lb_connection_v4` or `lb_connection_v6` IP address of the Advisor. The valid range of port values is 1 - 65535. Do not use spaces between the IP address, the two periods (.), and the port.

#### Requirements:

- This port number must match the port number specified in the `agent_connection_port` configuration statement for the Advisor.
- Only a complete IPv4 or IPv6 address is accepted. Host names, prefixes, or subnets are not allowed. The IPv4 INADDR\_ANY address (0.0.0.0) and the IPv6 unspecified address (::) are not allowed. The IP address must match either the `lb_connection_v4` or `lb_connection_v6` IP address.

## Usage

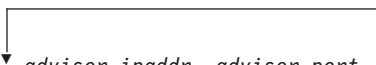
**Rule:** If you specify an IPv4 address on this statement, you must also specify an IPv4 address on the `host_connection` statement. Similarly, if you specify an IPv6 address on this statement, you must also specify an IPv6 address on the `host_connection` statement.

## advisor\_id\_list

Use the `advisor_id_list` statement to specify the IP address and port pairs of the primary Advisors that this Agent communicates with.

This statement is optional. However, if neither an `advisor_id` nor `advisor_id_list` statement is present in the configuration file, a terminating error occurs. If this statement is specified, the `advisor_id` statement cannot be specified, or a terminating error occurs.

## Syntax

```
➤—advisor_id_list—{——advisor_ipaddr..advisor_port—}—➤
```

## Parameters

*advisor\_ipaddr..advisor\_port*

Specifies the IPv4 or IPv6 addresses and port of the primary Advisors that this Agent communicates with. The Agent loops through all IP addresses until it successfully connects to the primary Advisor using one of these IP addresses. Each IP address must match either the `lb_connection_v4` or `lb_connection_v6` IP address of an Advisor. The valid range of port values is 1 - 65535. Do not put any spaces between the IP address, the two periods (.), and the port.

### Requirements:

- Only complete IPv4 or IPv6 addresses are accepted. Host names, prefixes, or subnets are not allowed. The IPv4 INADDR\_ANY address (0.0.0.0) and the IPv6 unspecified address (::) are not allowed.
- Each `advisor_ipaddr..advisor_port` 2-tuple must be specified on one line; it cannot be continued to a subsequent line.

## Usage

### Rules:

- The IP addresses specified must be either all IPv4 addresses or all IPv6 addresses. Do not mix IPv4 and IPv6 addresses in the list.
- If you specify IPv4 addresses on this statement, you must also specify an IPv4 address on the `host_connection` statement. Similarly, if you specify IPv6 addresses on this statement, you must also specify an IPv6 address on the `host_connection` statement.
- Do not specify more than two IP address and port pairs.

## debug\_level

Use the `debug_level` statement to specify the level of debug information that is logged.

## Syntax



## Parameters

### *level*

Specifies the debug level. If the AQSTRACE DD card was specified in the Agent started procedure, all log messages are written to internal memory, but only log messages at the ERROR, WARNING, and EVENT level are written to syslogd. If the AQSTRACE DD card was not specified, all log messages are written to syslogd. The level value represents a particular debug level or combination of debug levels. See “Debug levels” on page 35 for the possible values. The default level is 7 ( $1 + 2 + 4 = 7$ ), which means that all error, warning, and event messages are captured. The valid range is 0 - 255.

## Usage

- You can dynamically update this statement by using the `MODIFY procname,DEBUG` command.
- To log a combination of debug levels, add the specific debug level numbers together.

**Restriction:** Do not customize this statement unless you are directed to do so by an IBM Service representative. Adding additional types of trace data can cause the amount of data captured to become voluminous. Reducing the amount of trace data from the default might make diagnosing a problem more difficult.

## host\_connection

Use the `host_connection` statement to specify the local IP address and port that the Agent binds to for communicating with the primary Advisor.

## Syntax



## Parameters

### *host\_ipaddr..host\_port*

Use `host_ipaddr..host_port` to specify the IP address and port that this Agent binds to. The valid range of port values is 1 - 65535.

**Requirement:** Only a complete IPv4 or IPv6 address is accepted. Host names, prefixes, or subnets are not allowed. The IPv4 INADDR\_ANY address (0.0.0.0) and the IPv6 unspecified address (::) are not allowed. The IP address and port must match one of the IP address and port pairs specified in the `agent_id_list` configuration statement for the Advisor.

**Rule:** If you specify an IPv4 address on the `host_connection` statement, you must specify an IPv4 address on the `advisor_id` statement. Similarly, if you specify an IPv6 address on the `host_connection` statement, you must specify an IPv6 address on the `advisor_id` statement.

## Usage

### Guidelines:

- To ensure high availability, specify the IP addresses in the `agent_id_list` statement for the Advisor and the `host_connection` statement for each Agent as static VIPAs, so that individual link outages on the hosts are tolerated.
- To ensure simplicity and consistency, specify the same port for this statement for each Agent, and reserve this port on each TCP/IP stack where an Agent will be active.
- You can specify an IPv6 address on this statement if the host where the Agent resides is an IPv6-enabled TCP/IP stack, and the Advisor resides on an IPv6-enabled TCP/IP stack.
- You can have an AT-TLS policy enabled in addition to configuring this statement.





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## Chapter 7. Lifeline Advisor commands

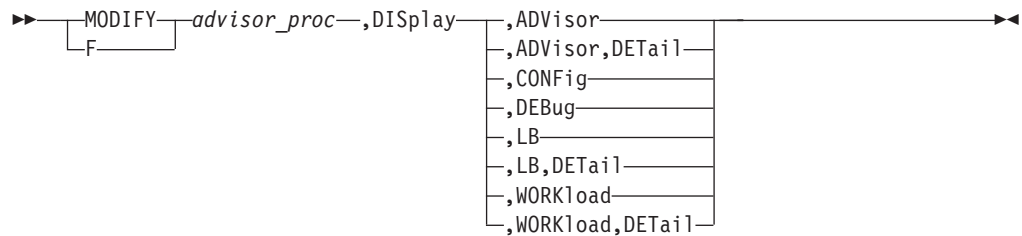
Use the Life Advisor commands to display Lifeline Advisor information and modify Lifeline Advisor state information.

---

### MODIFY *advisor\_proc*,DISplay command: Display Lifeline Advisor information

The MODIFY *advisor\_proc*,DISplay command displays the information related to the Lifeline Advisor.

#### Format



#### Parameters

##### *advisor\_proc*

Indicates the member name of the cataloged procedure used to start the Advisor.

##### DISplay,ADVisor

Displays information about the external load balancers, Agents, and peer Advisor that are connected to this Advisor. When you issue this command on the secondary Advisor with this parameter, information about the load balancer and Agent is not displayed.

##### DISplay,ADVisor,DETAil

Displays additional information, including the system name and site name where each Agent is and the system name where the peer Advisor is. When you issue this command on the secondary Advisor with this parameter, information about the load balancer and Agent is not displayed.

##### DISplay,CONFig

Displays the active configuration for this Advisor.

##### DISplay,DEBUg

Displays the debug level in effect for this Advisor.

The debug level displayed is the sum of one or more levels of debug messages being logged. See “Debug levels” on page 35 for more information about the debug levels.

##### DISplay,LB

Displays information about the load balancers that are connected to the primary Advisor. You can specify this parameter only on the primary Advisor.

**DISplay, LB, DETail**

Displays additional information, including the register groups and member data for each load balancer. You can specify this parameter only on the primary Advisor.

**DISplay, WORKload**

Displays information about the workloads and their current state. You can specify this parameter only from the primary Advisor.

**DISplay, WORKload, DETail**

Displays additional information, including the server applications that make up each workload. You can specify this parameter only from the primary Advisor.

**Examples**

The following example shows a sample display when you issue F AQSADV, DISPLAY, ADVISOR on the primary Advisor.

```
F AQSADV, DISPLAY, ADVISOR
AQS0141I ADVISOR SUMMARY
ADVISOR ROLE : PRIMARY
IPADDR : 192.10.1.1
LOAD BALANCERS:
 IPADDR : 192.10.1.32
 TIER : 1
 IPADDR : 192.10.1.64
 TIER : 2
AGENTS :
 IPADDR : 192.10.110.1
 IPADDR : 192.10.110.2
 IPADDR : 192.20.110.1
 IPADDR : 192.20.110.2
PEER ADVISOR :
IPADDR : 192.20.130.1
```

The following example shows a sample display when you issue F AQSADV, DISPLAY, ADVISOR on the secondary Advisor.

```
F AQSADV, DISPLAY, ADVISOR
AQS0141I ADVISOR SUMMARY
ADVISOR ROLE : SECONDARY
IPADDR : 192.20.130.1
PEER ADVISOR :
IPADDR : 192.10.1.1
```

The following information describes the fields in the previous sample display.

**Field name****Descriptions****ADVISOR ROLE**

The current role and IP address for this Advisor. The IP address can be an IPv4 or an IPv6 address. The Advisor role has the following values:

**PRIMARY**

Indicates that this Lifeline Advisor is responsible for the following tasks:

- Communicating with the Agents to retrieve information about the systems and server applications that are being monitored
- Communicating with external load balancers to provide routing recommendations for incoming requests for the configured workloads

- Communicating with the secondary Advisor to provide state information for the configured workloads

## SECONDARY

Indicates that this Lifeline Advisor is responsible for communicating with the primary Advisor to monitor whether this Advisor needs to take over the primary Advisor responsibilities.

## LOAD BALANCERS

The list of external load balancers connected to this Advisor, the IP address of each load balancer, and the tier level of each load balancer. The IP address can be an IPv4 or an IPv6 address. The LOAD BALANCERS field is displayed only when you issue the command on the primary Advisor and at least one load balancer is connected. The tier can be one of the following values:

- 1 Indicates that this load balancer is a first-tier load balancer. The load balancer is responsible for selecting the site that an inbound workload request is routed to.
- 2 Indicates that this load balancer is a second-tier load balancer. The load balancer is responsible for selecting the server application instance in a site that an inbound workload request is routed to.

## AGENTS

The list of Lifeline Agents connected to this Advisor and the IP address of the Agent. The IP address can be an IPv4 or an IPv6 address. The AGENTS field is displayed only when you issue the command on the primary Advisor and at least one Agent is connected.

## PEER ADVISOR

The IP address of the peer Advisor that is connected to this Advisor. The IP address can be an IPv4 or an IPv6 address. If no peer Advisor is connected, the IP address is displayed as NONE.

The following example shows a sample display when you issue F AQSADV,DISPLAY,ADVISOR,DETAIL on the primary Advisor.

```
F AQSADV,DISPLAY,ADVISOR,DETAIL
AQS0142I ADVISOR DETAILS
ADVISOR ROLE : PRIMARY
IPADDR : 192.10.1.1
LOAD BALANCERS:
IPADDR : 192.10.1.32
TIER : 1
IPADDR : 192.10.1.64
TIER : 2
AGENTS :
IPADDR : 192.10.110.1
SYSTEM NAME : SYS1A SITE : PLEX1
IPADDR : 192.10.110.2
SYSTEM NAME : SYS1B SITE : PLEX1
IPADDR : 192.20.110.1
SYSTEM NAME : SYS2A SITE : PLEX2
IPADDR : 192.20.110.2
SYSTEM NAME : SYS2B SITE : PLEX2
PEER ADVISOR :
IPADDR : 192.20.130.1
SYSTEM NAME : CNTL2
```

The following example shows a sample display when you issue F AQSADV,DISPLAY,ADVISOR,DETAIL on the secondary Advisor.

```
F AQSADV,DISPLAY,ADVISOR,DETAIL
AQS0142I ADVISOR DETAILS
ADVISOR ROLE : SECONDARY
IPADDR : 192.20.130.1
PEER ADVISOR :
IPADDR : 192.10.1.1
SYSTEM NAME : CNTL1
```

The following information describes the fields in the previous sample display.

### **Field name**

#### **Descriptions**

### **ADVISOR ROLE**

The current role and IP address for this Advisor. The IP address can be an IPv4 or an IPv6 address. The role has the following values:

#### **PRIMARY**

Indicates that this Advisor is responsible for the following tasks:

- Communicating with the Agents to retrieve information about the systems and server applications that are being monitored
- Communicating with external load balancers to provide routing recommendations for incoming requests for the configured workloads
- Communicating with the secondary Advisor to provide state information for the configured workloads

#### **SECONDARY**

Indicates that this Advisor is responsible for communicating with the primary Advisor to monitor whether this Advisor needs to take over the primary Advisor responsibilities.

### **LOAD BALANCERS**

The list of external load balancers connected to this Advisor, the IP address of the load balancer, and the tier level of the load balancer. The IP address can be an IPv4 or an IPv6 address. The LOAD BALANCERS field is only displayed when you issue the command on the primary Advisor and at least one load balancer is connected. The tier has the following values:

- 1** Indicates that this load balancer is a first-tier load balancer. The load balancer is responsible for selecting the site that an inbound workload request will be routed to.
- 2** Indicates that this load balancer is a second-tier load balancer. The load balancer is responsible for selecting the server application instance within a site that an inbound workload request will be routed to.

### **AGENTS**

The list of Lifeline Agents connected to this Advisor and the IP address of the Agent. The IP address can be an IPv4 or an IPv6 address. The AGENTS field is only displayed when you issue the command on the primary Advisor and at least one Agent is connected.

### **SYSTEM NAME**

The MVS system name where the connected Agent or peer Advisor is active. If no peer Advisor is connected, this field is not displayed in the PEER ADVISOR section.

**SITE** The MVS sysplex name of the system where the connected Agent exists.

## PEER ADVISOR

The IP address of the peer Advisor that is connected to this Advisor. The IP address can be an IPv4 or an IPv6 address. If no peer Advisor is connected, the IP address is displayed as NONE.

The following example shows a sample display when you issue F AQSADV,DISPLAY,CONFIG.

```
F AQSADV,DISPLAY,CONFIG
AQS0143I ADVISOR CONFIGURATION
VERSION : LIFELINE V2.0
CONFIG FILENAME : USER.PROFILES(LBADVCNF)
DEBUG LEVEL : 7
ADVISOR CONN PORT : 8200
ADVISOR ID LIST :
 IPADDR : 192.10.130.1
 IPADDR : 192.20.130.1
ADVISOR TIMEOUT : 10
ADVISOR TAKEOVER POLICY : MANUAL
AGENT CONN PORT : 8181
AGENT ID LIST :
 IPADDR..PORT : 192.10.110.1..4000
 IPADDR..PORT : 192.10.110.2..4000
 IPADDR..PORT : 192.20.110.1..4000
 IPADDR..PORT : 192.20.110.2..4000
UPDATE INTERVAL : 10
FAILURE DETECTION INTERVAL : 60
PEER ADVISOR ID : 192.10.1.1
LB CONNECTION V4 : 192.10.1.1..3860
LB CONNECTION V6 : 192::10:1:1..3860
LB ID LIST :
 IPADDR : 192.10.1.32
 IPADDR : 192.10.1.64
 IPADDR : 192::10:1:32
WORKLOAD SWITCH POLICY : MANUAL
CROSS SYSPLEX LIST :
 IPADDR..PORT : 192.10.1.64..5001
 SITE : PLEX1
 WORKLOAD : WORKLOAD1
 FAILURE DETECTION INTERVAL : 30
 IPADDR..PORT : 10.20.1.1..5001
 SITE : PLEX2
 WORKLOAD : WORKLOAD1
 FAILURE DETECTION INTERVAL : 30
 IPADDR..PORT : 192.10.1.64..6001
 SITE : PLEX1
 WORKLOAD : WORKLOAD1
 FAILURE DETECTION INTERVAL : 30
 IPADDR..PORT : 10.20.1.1..6001
 SITE : PLEX2
 WORKLOAD : WORKLOAD1
 FAILURE DETECTION INTERVAL : 30
 IPADDR..PORT : 10.20.1.1..8020
 SITE : PLEX2
 WORKLOAD : WORKLOAD2
 FAILURE DETECTION INTERVAL : 60
 IPADDR..PORT : 10.10.1.1..8020
 SITE : PLEX1
 WORKLOAD : WORKLOAD2
 FAILURE DETECTION INTERVAL : 60
 IPADDR..PORT : 10.10.1.1..8021
 SITE : PLEX1
 WORKLOAD : WORKLOAD2
 FAILURE DETECTION INTERVAL : 60
```

```
IPADDR..PORT : 10.20.1.1..8021
SITE : PLEX2
WORKLOAD : WORKLOAD2
FAILURE DETECTION INTERVAL : 60
QUERY WORKLOAD LIST:
WORKLOAD : WORKLOAD2
ASSOCIATED WORKLOAD : WORKLOAD1
DISTRIBUTION : DYNAMIC ACTION : TOACTIVE
PERSISTENT CONNECTION TIMEOUT : 0
```

The following information describes the fields in the previous sample display.

**Field name**

**Descriptions**

**VERSION**

The current version and release of the Advisor.

**CONFIG FILENAME**

The configuration file used by this Advisor when the Advisor was initially started.

**DEBUG LEVEL**

The debug level currently in effect for this Advisor.

**ADVISOR CONN PORT**

The port number that the primary Advisor listens on for connections from a peer Advisor.

**ADVISOR ID LIST**

The list of the IP addresses of secondary Advisors that are permitted to connect to the primary Advisor. The IP address can be an IPv4 or an IPv6 address.

**ADVISOR TIMEOUT**

The interval (in seconds) that the primary Advisor uses to determine whether another primary Advisor is active. The interval used by the secondary Advisor to determine whether the primary Advisor is down.

**ADVISOR TAKEOVER POLICY**

The action that a secondary Advisor takes when it determines that the primary Advisor is down. The takeover policy allows the following values:

**AUTOMATIC**

Indicates that the secondary Advisor automatically takes over the primary Advisor responsibilities.

**MANUAL**

Indicates that the secondary Advisor waits until a MODIFY AQSADV, TAKEOVER command is issued before the secondary Advisor takes over the primary Advisor responsibilities.

**AGENT CONN PORT**

The port number that the primary Advisor listens on for connections from Agents.

**AGENT ID LIST**

The list of IP addresses of Agents that are permitted to connect to the primary Advisor. The IP address can be an IPv4 or an IPv6 address.

**UPDATE INTERVAL**

The interval (in seconds) that an Agent uses to update the primary Advisor with information about the system and server applications being monitored. Depending on how the external load balancer is configured, the

update\_interval statement might also determine how often the load balancer is updated with data from the Lifeline Advisor.

#### **FAILURE DETECTION INTERVAL**

The interval (in seconds) that a primary Advisor uses to detect a site failure.

#### **PEER ADVISOR ID**

The IPv4 or IPv6 address that the Advisor uses as the destination IP address for connecting to the peer Advisor.

#### **LB CONNECTION V4**

The IPv4 address and port number that the primary Advisor listens on for connections from external load balancers.

#### **LB CONNECTION V6**

The IPv6 address and port number the primary Advisor listens on for connections from external load balancers.

#### **LB ID LIST**

The list of the IP addresses of external load balancers that are permitted to connect to the primary Advisor. The IP address can be an IPv4 or an IPv6 address.

#### **WORKLOAD SWITCH POLICY**

The action that a primary Advisor takes when it determines that a workload is no longer active. The switch policy allows the following values:

##### **AUTOMATIC**

Indicates that the primary Advisor automatically reroutes a failing workload to the alternate site.

##### **MANUAL**

Indicates that the primary Advisor waits until a MODIFY AQSADV,ACTIVATE command is issued before the primary Advisor reroutes a failing workload to the alternate site.

#### **CROSS SYSPLEX LIST**

The list of both the external and internal second-tier load balancer IP addresses, the site name (i.e. sysplex name) that identifies each second-tier load balancer, the port number of the server application used for a specific workload, the workload name, and the failure detection interval for the workload. The IP address can be an IPv4 or an IPv6 address.

#### **QUERY WORKLOAD LIST**

The list of the Active/Query and associated Active/Standby workloads, the distribution type, distribution option, and persistent connection timeout for the Active/Query workload. The distribution type can be DYNAMIC or STATIC.

The following example shows a sample display when you issue F AQSADV,DISPLAY,DEBUG.

```
F AQSADV,DISPLAY,DEBUG
AQS0111I LLADVSR DEBUG LEVEL 7
```

The following example shows a sample display when you issue F AQSADV,DISPLAY,LB.

```
F AQSADV,DISPLAY,LB
AQS0112I LOAD BALANCER SUMMARY
LB INDEX : 00 UUID : F956AE65
```

```

IPADDR..PORT : 192.10.1.64..55764
HEALTH : 7E FLAGS : NOCHANGE PUSH
LB INDEX : 01 UUID : 9A78BE9E
IPADDR..PORT : 192.10.1.32..40366
HEALTH : 7E FLAGS : NOCHANGE PUSH
2 OF 2 RECORDS DISPLAYED

```

The following information describes the fields in the previous sample display.

### Field name

#### Descriptions

#### LB INDEX

The reference number used to identify the load balancer. The same reference number is used for a load balancer as long as it remains connected.

**UUID** A hexadecimal value of the universally unique identifier assigned by the load balancer. This byte array can be up to 64 bytes in length. Only one load balancer with the same UUID can be connected to the primary Advisor at the same time.

#### IPADDR..PORT

The IP address and port number used by the load balancer to connect to the primary Advisor. The IP address can be an IPv4 or an IPv6 address.

#### HEALTH

A hexadecimal value supplied by the load balancer that indicates the general health of the load balancer. Valid values are in the range from 0 to X'7F'.

#### FLAGS

Indicators set by the load balancer. The flag values are shown as follows:

#### NOCHANGE

Indicates that the primary Advisor sends only weights that have changed since the last update interval to the load balancer.

**PUSH** Indicates that the primary Advisor sends weights to the external load balancer when the update\_interval has expired. If this flag is not present, the load balancer periodically retrieves weights from the primary Advisor.

#### TRUST

Indicates that the load balancer trusts member applications to register themselves. This flag is ignored by the primary Advisor.

The following example shows a sample display when you issue F AQSADV,DISPLAY,LB,DETAIL.

```

F AQSADV,DISPLAY,LB,DETAIL
AQS0113I LOAD BALANCER DETAILS
LB INDEX : 00 UUID : F956AE65
IPADDR..PORT : 192.10.1.64..55764
HEALTH : 7E FLAGS : NOCHANGE PUSH
GROUP NAME : WKLD2_GROUP1
WORKLOAD : WORKLOAD2
GROUP FLAGS : CROSS_SYSPLEX
IPADDR..PORT: 10.10.1.1..8020
SYSPLEX : PLEX1
SYSTEM NAME : N/A PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : N/A CS WEIGHT : N/A NET WEIGHT: 00001
FLAGS : DISTDVIPA
IPADDR..PORT: 10.20.1.1..8020
SYSPLEX : PLEX2

```



```

SYSTEM NAME: N/A PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : N/A CS WEIGHT : N/A NET WEIGHT: 00000
FLAGS : CMQ DISTDVIPA
GROUP NAME : WKLD2_GROUP2
WORKLOAD : WORKLOAD2
GROUP FLAGS : CROSS_SYSPLEX
IPADDR..PORT: 10.10.1.1..8021
SYSPLEX : PLEX1
SYSTEM NAME: N/A PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : N/A CS WEIGHT : N/A NET WEIGHT: 00001
FLAGS : DISTDVIPA
IPADDR..PORT: 10.20.1.1..8021
SYSPLEX : PLEX2
SYSTEM NAME: N/A PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : N/A CS WEIGHT : N/A NET WEIGHT: 00000
FLAGS : CMQ DISTDVIPA
GROUP NAME : WKLD1_GROUP1
WORKLOAD : WORKLOAD1
GROUP FLAGS : CROSS_SYSPLEX
IPADDR..PORT: 192.10.1.32..5001
SYSPLEX : PLEX1
SYSTEM NAME: N/A PROTOCOL : TCP AVAIL : NO
WLM WEIGHT : N/A CS WEIGHT : N/A NET WEIGHT: 00000
FLAGS : CMQ
IPADDR..PORT: 10.20.1.1..5001
SYSPLEX : PLEX2
SYSTEM NAME: N/A PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : N/A CS WEIGHT : N/A NET WEIGHT: 00001
FLAGS : DISTDVIPA
GROUP NAME : WKLD1_GROUP2
WORKLOAD : WORKLOAD1
GROUP FLAGS : CROSS_SYSPLEX
IPADDR..PORT: 192.10.1.32..6001
SYSPLEX : PLEX1
SYSTEM NAME: N/A PROTOCOL : TCP AVAIL : NO
WLM WEIGHT : N/A CS WEIGHT : N/A NET WEIGHT: 00000
FLAGS : CMQ
IPADDR..PORT: 10.20.1.1..6001
SYSPLEX : PLEX2
SYSTEM NAME: N/A PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : N/A CS WEIGHT : N/A NET WEIGHT: 00001
FLAGS : DISTDVIPA
LB INDEX : 01 UUID : 9A78BE9E
IPADDR..PORT: 192.10.1.32..40366
HEALTH : 7E FLAGS : NOCHANGE PUSH
GROUP NAME : TIER2_GROUP1
WORKLOAD : WORKLOAD1
GROUP FLAGS :
IPADDR..PORT: 192.10.110.1..5001
SYSPLEX : PLEX1
SYSTEM NAME: SYS1A PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : 00058 CS WEIGHT : 100 NET WEIGHT: 00001
RAW CP: 58 ZAAP: 00 ZIIP: 00
PROPORTIONAL CP: 58 ZAAP: 00 ZIIP: 00
ABNORM : 00000 HEALTH : 100
FLAGS :
IPADDR..PORT: 192.10.110.2..5001
SYSPLEX : PLEX1
SYSTEM NAME: SYS1B PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : 00059 CS WEIGHT : 100 NET WEIGHT: 00001
RAW CP: 59 ZAAP: 00 ZIIP: 00
PROPORTIONAL CP: 58 ZAAP: 00 ZIIP: 00
ABNORM : 00000 HEALTH : 100
FLAGS :
GROUP NAME : TIER2_GROUP2
WORKLOAD : WORKLOAD2
GROUP FLAGS :

```

```

IPADDR..PORT: 192.10.110.1..6001
SYSPLEX : PLEX1
SYSTEM NAME: SYS1A PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : 00058 CS WEIGHT : 100 NET WEIGHT: 00001
RAW CP: 58 ZAAP: 00 ZIIP: 00
PROPORTIONAL CP: 58 ZAAP: 00 ZIIP: 00
ABNORM : 00000 HEALTH : 100
FLAGS :
IPADDR..PORT: 192.10.110.2..6001
SYSPLEX : PLEX1
SYSTEM NAME: SYS1B PROTOCOL : TCP AVAIL : YES
WLM WEIGHT : 00059 CS WEIGHT : 100 NET WEIGHT: 00001
RAW CP: 59 ZAAP: 00 ZIIP: 00
PROPORTIONAL CP: 58 ZAAP: 00 ZIIP: 00
ABNORM : 00000 HEALTH : 100
FLAGS :
2 OF 2 RECORDS DISPLAYED

```

The following information describes the fields in the previous sample display.

**Field name**  
**Descriptions**

**LB INDEX**

A reference number used to identify the load balancer. The same reference number is used for a load balancer as long as it remains connected.

**UUID** A hexadecimal value of the universally unique identifier assigned by the load balancer. This byte array can be up to 64 bytes in length. Only one load balancer with the same UUID can be connected to the primary Advisor at the same time.

**IPADDR..PORT**

- The instance listed under the LB INDEX field represents the IP address and port number used by the load balancer to connect to the primary Advisor. The IP address can be an IPv4 or an IPv6 address.
- The instances listed within the GROUP NAME block for first-tier load balancers represent the IP address and port number of a second-tier load balancers that the first-tier load balancer balances workload requests.
- The instances listed within the GROUP NAME block for second-tier load balancers represent the IP address and port number of a target server application that the second-tier load balancer balances workload requests.

**HEALTH**

A hexadecimal value supplied by the load balancer that indicates the general health of the load balancer. Valid values are in the range from 0 to X'7F'.

**FLAGS**

Indicators set by the load balancer. The flag values are shown as follows:

**NOCHANGE**

Indicates that the primary Advisor sends only weights that have changed since the last update interval to the load balancer.

**PUSH** Indicates that the primary Advisor sends weights to the external load balancer when the update\_interval has expired. If this flag is not present, the load balancer periodically retrieves weights from the primary Advisor.

**TRUST**

Indicates that the load balancer trusts member applications to register themselves. This flag is ignored by the primary Advisor.

**GROUP**

The name of a registered group of related target server applications. The group name is a UTF-8 string displayed in EBCDIC on the MVS console. Any non-displayable character is displayed as a question mark (?).

**GROUP FLAGS**

The flags currently applicable to the group. Group flags are only valid for first-tier load balancers; for second-tier load balancers, this field is left blank. Here is the flag value:

**CROSS\_SYSPLEX**

The group is a cross-sysplex group. This group is used to balance the workload across multiple sysplexes. The IP addresses specified in each cross-sysplex group identify the second-tier load balancers that the first-tier load balancer will balance across.

**SYSPLEX**

For a first-tier load balancer group, the value of SYSPLEX indicates the MVS sysplex name where the specified second-tier load balancer will load balance to.

For a second-tier load balancer group, the value of SYSPLEX indicates the MVS sysplex name of the system where the server application being load balanced exists.

**SYSTEM NAME**

For a first-tier load balancer group, the system name is N/A, because the registered members are second-tier load balancers. For a second-tier load balancer group, the system name is the name of the MVS system where the server application exists.

**PROTOCOL**

The protocol used by the second-tier load balancer for first-tier load balancer groups or server application for second-tier load balancer groups. Protocol value is either TCP or UDP.

**AVAIL**

Indicates whether the second-tier load balancer for a first-tier load balancer group or the server application for a second-tier load balancer group is available for workload distribution. The value YES indicates that the second-tier load balancer or the server application is available for load balancing. The value NO indicates that the second-tier load balancer or the server application is not recommended for load balancing.

**WLM WEIGHT**

The server-specific Workload Manager (WLM) weight value of the server application. For a first-tier load balancer group, the WLM weight is N/A, because the registered members are second-tier load balancers. For a second-tier load balancer group, the value is a composite weight, in the range 0 - 64, which indicates the sum of the proportional CP, zAAP, and zIIP weights for this server application.

**CP** Indicates that the RAW value is the WLM server-specific general CP recommendation. This is the amount of displaceable general CPU capacity based on the importance, which is defined by the WLM policy, of the server application as compared to the other target systems within the same MVS sysplex. The

PROPORTIONAL value is the RAW value modified by the proportion of general CP capacity that is currently being consumed by the workload of the server application as compared with the other processors (zAAP and zIIP).

**zAAP** Indicates that the RAW value is the WLM server-specific zAAP recommendation. This is the amount of displaceable zAAP capacity based on the importance, which is defined by the WLM policy, of the server application as compared to the other target systems within the same MVS sysplex. The PROPORTIONAL value is the RAW value modified by the proportion of zAAP capacity that is currently being consumed by the workload of the server application as compared with the other processors (general CPU and zIIP).

**zIIP** Indicates that the RAW value is the WLM server-specific zIIP recommendation. This is the amount of displaceable zIIP capacity based on the importance, which is defined by the WLM policy, of the server application as compared with the other target systems within the same MVS sysplex. The PROPORTIONAL value is the RAW value modified by the proportion of zIIP capacity that is currently being consumed by the workload of the server application as compared with the other processors (general CPU and zAAP).

#### **ABNORM**

Indicates the rate of abnormal transaction completions per 1000 total transaction completions. The value is nonzero if the server application is experiencing conditions in which transactions are not completed. It is applicable to server applications that report transaction status using Workload Management Services. Under normal conditions or if the server application is not providing this information to WLM, the value of ABNORM is 0. WLM uses abnormal transaction completion rate information to reduce the WLM weight reported for the server application.

#### **HEALTH**

The general health of the server application. Values less than 100 indicate that the server application is experiencing conditions that are not enabling it to process new workload requests successfully. It is applicable to server applications that report their health using Workload Management Services. Under normal circumstances or if the server application is not providing this information to WLM, the value of HEALTH is 100. WLM uses health information to reduce the WLM weight reported for the server application.

#### **CS WEIGHT**

The Communications Server (CS) weight value recommended by the Lifeline Agent. For a first-tier load balancer group, the CS weight is N/A, because the registered members are second-tier load balancers. For a second-tier load balancer group, the CS weight value range is 0 - 100. A higher weight indicates that the server application is able to handle more workload requests than a server application in the same group with a lower weight.

#### **NET WEIGHT**

For a first-tier load balancer group, NET WEIGHT indicates the relative weight of this second-tier load balancer compared to other second-tier load balancers for this workload. For members of an Active/Standby workload,

the net weight is either 0 or 1, with a value of 0 indicating that no workload requests are being distributed to this second-tier load balancer, while a value of 1 indicating that workload requests can be distributed to this second-tier load balancer.

For members of an Active/Query workload, the net weight value range is 0 - 64. A higher weight indicates that the site where the second-tier load balancer routes to can handle more requests for the workload than the alternate site. This weight is based on the WLM weight, the CS weight, database replication latency state, and other factors. Weights within a group are normalized to yield the net weight. Normalization involves reducing the weight values while preserving the ratios between the weights.

Additional factors might affect the NET WEIGHT of a first-tier load balancer group. If the site that a second-tier load balancer is routing to is not active, the net weight for this second-tier load balancer is 0 so that new work requests are not sent to this site. The net weight is also affected by the type of second-tier load balancers in the group; they might be sysplex distributed DVIPAs, external load balancers, or intermediary nodes. For more information, see "Interpreting the workload and LB displays" on page 37.

For a second-tier load balancer group, NET WEIGHT indicates the relative weight of this server application compared with other server applications within the same site for this workload. The net weight value range is 0 - 64. A higher weight indicates that a server application can handle more workload requests than a lower weight server application in the same group. This weight is based upon the WLM weight, the CS weight, and other factors. Compare net weights for server applications only with other server applications within the same group. Weights within a group are normalized to yield the net weight. Normalization involves reducing the weight values while preserving the ratios between the weights.

## FLAGS

Indicators for the target server applications. The flag values are shown as follows:

**CMQ** Indicates that the member's site and workload were quiesced with a `MODIFY advisor_proc,QUIESCE` command. No new workload connections are routed to server applications for the specified site and workload.

### **DISTDVIPA**

Indicates that the IP address of the server application is a distributable DVIPA. The IP address can be an IPv4 or an IPv6 address.

**LBQ** Indicates that an operator at the Load Balancer quiesced the member. No new workload connections are routed to the server application.

### **NODATA**

Indicates that an Agent reported the server application, but at least two update intervals are needed to calculate a valid CS weight.

### **NOTARGETAPP**

Indicates that an Agent reported the member's IP address on a TCP/IP stack but did not find a server application that uses the same port and protocol.

**NOTARGETIP**

Indicates that an Agent reported the member's IP address on a TCP/IP stack but the IP address is not usable.

**NOTARGETSYS**

Indicates that no Agent reported the member's IP address on any TCP/IP stacks in either site.

**OPQ**

Indicates that an operator at the owning Agent quiesced the server application or system. No new workload connections are routed to this server application or system.

The following example shows a sample display when you issue F AQSADV,DISPLAY,WORKLOAD.

```
F AQSADV,DISPLAY,WORKLOAD
AQS0145I WORKLOAD SUMMARY
TYPE : ACTIVE/STANDBY
WORKLOAD NAME : WORKLOAD1
STATE : ACTIVE
SITE : PLEX2
TYPE : ACTIVE/QUERY
WORKLOAD NAME : WORKLOAD2
STATE : ACTIVE
SITE : PLEX1
SITE : PLEX2
ASSOCIATED WORKLOAD : WORKLOAD1
REPLICATION STATE : NORMAL
2 OF 2 RECORDS DISPLAYED
```

The following information describes the fields in the previous sample display.

**Field name****Descriptions**

**TYPE** The type of workload. Type values are shown as follows:

**ACTIVE/STANDBY**

Indicates that the workload has been configured so that it can be activated to only one site at any one time.

**ACTIVE/QUERY**

Indicates that the workload has been configured so that it can be activated to both sites at the same time.

**WORKLOAD NAME**

The name of the workload as defined in the cross\_sysplex\_list Advisor configuration statement.

**STATE**

The state of the workload. State values are shown as follows:

**ACTIVE**

Indicates that the workload has been activated to the specified site. The Advisor notifies first-tier load balancers to route all inbound requests for this workload to the specified site.

**QUIESCED**

Indicates that the workload has been quiesced to all sites. The Advisor notifies first-tier load balancers to not route any inbound requests for this workload.

**SITE** The MVS sysplex name where the workload is active. If the state of the

workload is QUIESCED, the SITE value is set to N/A. For Active/Query workloads, if the workload is active on both sites, a separate line for each site is displayed.

### ASSOCIATED WORKLOAD

For workloads of type Active/Query, the associated Active/Standby workload.

### REPLICATION STATE

For workloads of type Active/Query, the current state of data replication for the associated Active/Standby workload. See the specific database replication product documentation for information about how to configure replication latency thresholds. State values are shown as follows:

#### NORMAL

Indicates that the replication latency is within the acceptable threshold that was configured for database replication for this workload.

#### CONSTRAINED

Indicates that the replication latency is within 80% of the maximum threshold that was configured for database replication for this workload.

#### CRITICAL

Indicates that the replication latency is within 90% of the maximum threshold that was configured for database replication for this workload.

#### ACUTE

Indicates that the replication latency has exceeded the maximum threshold that was configured for database replication for this workload.

#### UNKNOWN

Indicates that the replication latency value has either not been reported by the database replication product, or the database replication product cannot determine the current replication latency state.

The following example shows a sample display when you issue F AQSADV,DISPLAY,WORKLOAD,DETAIL.

```
F AQSADV,DISPLAY,WORKLOAD,DETAIL
AQS0146I WORKLOAD DETAILS
TYPE : ACTIVE/STANDBY
WORKLOAD NAME : WORKLOAD1
STATE : ACTIVE
SITE : PLEX2
SERVERS:
IPADDR..PORT : 192.10.110.1..5001
SYSTEM NAME : SYS1A SYSPLEX : PLEX1 STATUS : AVAIL
IPADDR..PORT : 10.20.1.1..5001
SYSTEM NAME : SYS2A SYSPLEX : PLEX2 STATUS : AVAIL
IPADDR..PORT : 192.10.110.2..5001
SYSTEM NAME : SYS1B SYSPLEX : PLEX1 STATUS : AVAIL
IPADDR..PORT : 10.20.1.1..5001
SYSTEM NAME : SYS2B SYSPLEX : PLEX2 STATUS : UNAVAIL
IPADDR..PORT : 192.10.110.1..6001
SYSTEM NAME : SYS1A SYSPLEX : PLEX1 STATUS : AVAIL
IPADDR..PORT : 10.20.1.1..6001
SYSTEM NAME : SYS2A SYSPLEX : PLEX2 STATUS : AVAIL
IPADDR..PORT : 192.10.110.2..6001
SYSTEM NAME : SYS1B SYSPLEX : PLEX1 STATUS : AVAIL
```

```

IPADDR..PORT : 10.20.1.1..6001
SYSTEM NAME : SYS2B SYSPLEX : PLEX2 STATUS : AVAIL
TYPE : ACTIVE/QUERY
WORKLOAD NAME : WORKLOAD2
STATE : ACTIVE
SITE : PLEX1
SITE : PLEX2
ASSOCIATED WORKLOAD : WORKLOAD1
REPLICATION STATE : NORMAL
SERVERS:
IPADDR..PORT : 10.10.1.1..8020
SYSTEM NAME : SYS1A SYSPLEX : PLEX1 STATUS : AVAIL
IPADDR..PORT : 10.10.1.1..8020
SYSTEM NAME : SYS1B SYSPLEX : PLEX1 STATUS : AVAIL
IPADDR..PORT : 10.20.1.1..8020
SYSTEM NAME : SYS2A SYSPLEX : PLEX2 STATUS : AVAIL
IPADDR..PORT : 10.20.1.1..8020
SYSTEM NAME : SYS2B SYSPLEX : PLEX2 STATUS : AVAIL
IPADDR..PORT : 10.10.1.1..8021
SYSTEM NAME : SYS1A SYSPLEX : PLEX1 STATUS : UNAVAIL
IPADDR..PORT : 10.10.1.1..8021
SYSTEM NAME : SYS1B SYSPLEX : PLEX1 STATUS : AVAIL
IPADDR..PORT : 10.20.1.1..8021
SYSTEM NAME : SYS2A SYSPLEX : PLEX2 STATUS : AVAIL
IPADDR..PORT : 10.20.1.1..8021
SYSTEM NAME : SYS2B SYSPLEX : PLEX2 STATUS : AVAIL
2 OF 2 RECORDS DISPLAYED

```

The following information describes the fields in the previous sample display.

**Field name**

**Descriptions**

**TYPE** The type of workload. Type values are shown as follows:

**ACTIVE/STANDBY**

Indicates that the workload has been configured so that it can be activated to only one site at any one time.

**ACTIVE/QUERY**

Indicates that the workload has been configured so that it can be activated to both sites at the same time.

**WORKLOAD NAME**

The name of the workload as defined in the cross\_sysplex\_list Advisor configuration statement.

**STATE**

The state of the workload. State values are shown as follows:

**ACTIVE**

Indicates that the workload has been activated to the specified site. The Advisor notifies first-tier load balancers to route all inbound requests for this workload to the specified site.

**QUIESCED**

Indicates that the workload has been quiesced to all sites. The Advisor notifies first-tier load balancers to not route any inbound requests for this workload.

**SITE** The MVS sysplex name where the workload is active. If the state of the workload is QUIESCED, the SITE value is set to N/A. For Active/Query workloads, if the workload is active on both sites, a separate line for each site is displayed.



**ASSOCIATED WORKLOAD**

For workloads of type Active/Query, the associated Active/Standby workload.

**REPLICATION STATE**

For workloads of type Active/Query, the current state of data replication for the associated Active/Standby workload. See the specific database replication product documentation for information about how to configure replication latency thresholds. State values are shown as follows:

**NORMAL**

Indicates that the replication latency is within the acceptable threshold that was configured for database replication for this workload.

**CONSTRAINED**

Indicates that the replication latency is within 80% of the maximum threshold that was configured for database replication for this workload.

**CRITICAL**

Indicates that the replication latency is within 90% of the maximum threshold that was configured for database replication for this workload.

**ACUTE**

Indicates that the replication latency has exceeded the maximum threshold that was configured for database replication for this workload.

**UNKNOWN**

Indicates that the replication latency value has either not been reported by the database replication product, or the database replication product cannot determine the current replication latency state.

**IPADDR..PORT**

The IP address and port number that the server application is listening on. The IP address can be an IPv4 or an IPv6 address.

**SYSTEM NAME**

The MVS system name of the system where the server application exists.

**SYSPLEX**

The MVS sysplex name of the system where the server application exists.

**STATUS**

The status of the server application. Status values are shown as follows:

**AVAIL**

Indicates that the server application is available on the specified system and is able to process workload requests.

**UNAVAIL**

Indicates that the server application is not available on the specified system and is not able to process workload requests. Possible reasons for the server application being unavailable include not being active on the specified system or quiesced by the MVS operator.

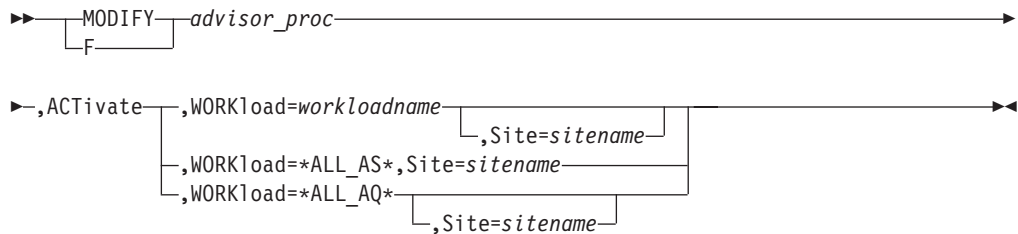
---

## MODIFY *advisor\_proc*,ACTivate command: Activate workloads

Use the MODIFY *advisor\_proc*,ACTivate command to force the Lifeline Advisor to signal first-tier load balancers that new connections for the specified workload or for all the workloads can be routed to the requested site.

**Rule:** You can issue this command only from the primary Advisor.

### Format



### Parameters

*advisor\_proc*

Indicates the member name of the cataloged procedure used to start the Advisor.

#### ACTivate

Signals the first-tier load balancers that a workload can be distributed to a site.

#### WORKload=

*workloadname*

Specifies the name of the workload to be activated. The name must match one of the workload names specified in the cross\_sysplex\_list Advisor configuration statement. The *workloadname* value must not exceed 64 characters in length.

#### Rules:

- You must quiesce the specified workload before you issue the command to activate it.
- If active connections remain active after you quiesce the specified workload, you must deactivate the workload before you issue the command to activate it.

#### \*ALL\_AS\*

Indicates that all the Active/Standby workloads specified in the cross\_sysplex\_list Advisor configuration statement are to be activated on the requested site.

#### Rules:

- You must quiesce all the Active/Standby workloads before you issue the command to activate them.
- If active connections remain active for one or more of the Active/Standby workloads after you quiesce the workloads, you must deactivate the applicable workloads before you issue the command to activate them.

**\*ALL\_AQ\***

Indicates that all the Active/Query workloads specified in the `cross_sysplex_list` Advisor configuration statement are to be activated on the requested site if specified, or on both sites.

**Guideline:** \*ALL\* is deprecated and, if specified, is processed like \*ALL\_AS\*.

**Site=*sitename***

Specifies the name of the site where the workload is to be distributed. The name must match one of the site names specified in the `cross_sysplex_list` Advisor configuration statement. The *sitename* value must not exceed 8 characters in length.

For an Active/Query workload, the Site keyword is optional. If not specified, the workload is activated on both sites.

**Examples**

The following example shows a sample display when you activate an Active/Standby workload by issuing `F AQSADV,ACTIVATE,WORKLOAD=WORKLOAD1,SITE=PLEX1` on the primary Advisor.

```
F AQSADV,ACTIVATE,WORKLOAD=WORKLOAD1,SITE=PLEX1
AQS0153I WORKLOAD WORKLOAD1 ACTIVATED ON SITE PLEX1
```

The following example shows a sample display when you activate an Active/Query workload by issuing `F AQSADV,ACTIVATE,WORKLOAD=WORKLOAD2` on the primary Advisor.

```
F AQSADV,ACTIVATE,WORKLOAD=WORKLOAD2
AQS0155I WORKLOAD WORKLOAD2 ACTIVATED
```

The following example shows a sample display when you activate all Active/Standby workloads by issuing `F AQSADV,ACTIVATE,WORKLOAD=*ALL_AS*,SITE=PLEX1` on the primary advisor.

```
F AQSADV,ACTIVATE,WORKLOAD=*ALL_AS*,SITE=PLEX1
AQS0201I ALL MATCHING WORKLOADS ACTIVATED ON SITE PLEX1
```

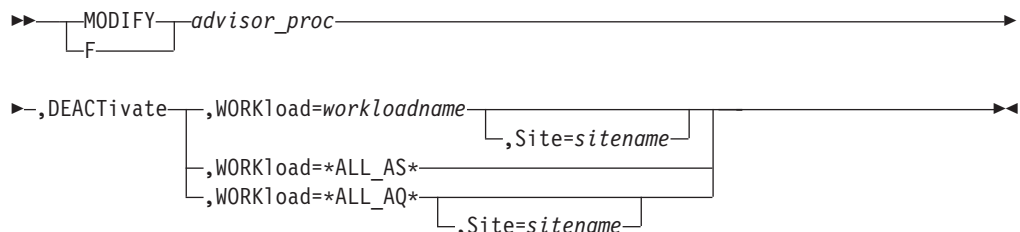
---

**MODIFY *advisor\_proc*,DEACTivate command: Deactivate workloads**

Use the `MODIFY advisor_proc,DEACTivate` command to force the Lifeline Advisor to reset all the existing connections for the specified workload or for all workloads.

**Rule:** You can issue this command only from the primary Advisor.

**Format**



## Parameters

*advisor\_proc*

Indicates the member name of the cataloged procedure used to start the Advisor.

### DEACTivate

Signals the Advisor that a workload needs to be deactivated.

### WORKload=

*workloadname*

Specifies the name of the workload to be deactivated. The name must match one of the workload names specified in the `cross_sysplex_list` Advisor configuration statement. The *workloadname* value must not exceed 64 characters in length.

**Rule:** You must quiesce the specified workload before you issue the command to deactivate it.

### \*ALL\_AS\*

Indicates that all the Active/Standby workloads specified in the `cross_sysplex_list` Advisor configuration statement are to be deactivated.

**Rule:** You must quiesce all the Active/Standby workloads before you issue the command to deactivate them.

### \*ALL\_AQ\*

Indicates that all the Active/Query workloads specified in the `cross_sysplex_list` Advisor configuration statement are to be deactivated on the requested site if specified, or on both sites.

**Rule:** You must quiesce all the Active/Query workloads on the sites before you issue the command to deactivate them.

**Guideline:** \*ALL\* is deprecated and, if specified, is processed like \*ALL\_AS\*.

### Site=sitename

Specifies the name of the site where the Active/Query workload is to be deactivated. The name must match one of the site names specified in the `cross_sysplex_list` Advisor configuration statement. The *sitename* value must not exceed 8 characters in length. The Site keyword is optional. If not specified, the workload is deactivated on both sites.

For an Active/Standby workload, the Site keyword is not allowed. The workload is deactivated on the site where the workload was last quiesced.

## Examples

The following example shows a sample display when you deactivate an Active/Standby workload by issuing `F AQSADV,DEACTIVATE,WORKLOAD=WORKLOAD1` on the primary Advisor.

```
F AQSADV,DEACTIVATE,WORKLOAD=WORKLOAD1
AQS0155I WORKLOAD WORKLOAD1 DEACTIVATED
```

The following example shows a sample display when you deactivate an Active/Query workload by issuing `F AQSADV,DEACTIVATE,WORKLOAD=WORKLOAD2` on the primary Advisor.

```
F AQSADV,DEACTIVATE,WORKLOAD=WORKLOAD2
AQS0155I WORKLOAD WORKLOAD2 DEACTIVATED
```

The following example shows a sample display when you issue F AQSADV,DEACTIVATE,WORKLOAD=\*ALL\_AS\* on the primary Advisor.

```
F AQSADV,DEACTIVATE,WORKLOAD=*ALL_AS*
AQS0202I ALL MATCHING WORKLOADS DEACTIVATED
```

---

## MODIFY *advisor\_proc*,DEBug command: Change the debug level

Use the MODIFY *advisor\_proc*,DEBug command to change the debug level that is in effect for the Lifeline Advisor.

### Format

```
►►—MODIFY—advisor_proc—,DEBug—,Level=debuglevel—►►
 └─┬─┘
 F
```

### Parameters

*advisor\_proc*

Indicates the member name of the cataloged procedure used to start the Advisor.

DEBug, Level=*debuglevel*

Changes the debug level in effect for this Advisor. The debug level that you can set is the sum of one or more levels of the debug messages to be logged. See “Debug levels” on page 35 for information about debug level values.

### Example

The following example shows a sample display when you issue F AQSADV,DEBUG,LEVEL=127 on the Advisor.

```
F AQSADV,DEBUG,LEVEL=127
AQS0138I LLADVSR DEBUG LEVEL UPDATED
```

---

## MODIFY *advisor\_proc*,DUMPLog command: Dump the internal debug records

Use the MODIFY *advisor\_proc*,DUMPLog command to dump the internal debug records to the HFS file specified by the AQSTRACE DD card in the Advisor started procedure.

### Format

```
►►—MODIFY—advisor_proc—,DUMPLog—►►
 └─┬─┘
 F
```

### Parameters

*advisor\_proc*

Indicates the member name of the cataloged procedure used to start the Advisor.

DUMPLog

Signals the Advisor that the internal debug records need to be dumped. Any existing data in the target HFS file will be overwritten.

## Example

The following example shows a sample display when you issue F AQSADV,DUMPLOG on the Advisor.

```
F AQSADV,DUMPLOG
AQS0204I LLADVSR INTERNAL LOG DUMPED
```

---

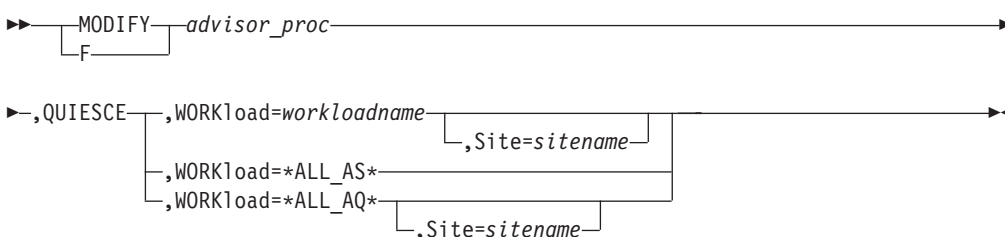
## MODIFY *advisor\_proc*, QUIESCE command: Quiesce workloads

Use the MODIFY *advisor\_proc*, QUIESCE command to force the Lifeline Advisor to signal the first-tier load balancers that no new connections are to be routed for the specified workload or for all workloads.

**Note:** Existing connections for this workload will continue to be routed.

**Rule:** You can issue this command only from the primary Advisor.

### Format



### Parameters

#### *advisor\_proc*

Indicates the member name of the cataloged procedure used to start the Advisor.

#### QUIESCE

Signals the first-tier load balancers that a workload can no longer be distributed to a site.

#### WORKload=

##### *workloadname*

Specifies the name of the workload to be quiesced. The name must match one of the workload names specified in the cross\_sysplex\_list Advisor configuration statement. The *workloadname* value must be less than or equal to 64 characters in length.

##### \*ALL\_AS\*

Indicates that all the Active/Standby workloads specified in the cross\_sysplex\_list Advisor configuration statement are to be quiesced.

##### \*ALL\_AQ\*

Indicates that all the Active/Query workloads specified in the cross\_sysplex\_list Advisor configuration statement are to be quiesced on the requested site if specified, or on both sites.

**Guideline:** \*ALL\* is deprecated and, if specified, is processed like \*ALL\_AS\*.

#### Site=*sitename*

Specifies the name of the site where the Active/Query workload is to be

quiesced. The name must match one of the site names specified in the `cross_sysplex_list` Advisor configuration statement. The `sitename` value must not exceed 8 characters in length. The `Site` keyword is optional. If not specified, the workload is quiesced on both sites.

For an Active/Standby workload, the `Site` keyword is not allowed. The workload is quiesced on the site where it was previously activated.

## Examples

The following example shows a sample display when you quiesce an Active/Standby workload by issuing `F AQSADV,QUIESCE,WORKLOAD=WORKLOAD1` on the primary Advisor.

```
F AQSADV,QUIESCE,WORKLOAD=WORKLOAD1
AQS0155I WORKLOAD WORKLOAD1 QUIESCED
```

The following example shows a sample display when you quiesce an Active/Query workload by issuing `F AQSADV,QUIESCE,WORKLOAD=WORKLOAD2` on the primary Advisor.

```
F AQSADV,QUIESCE,WORKLOAD=WORKLOAD2
AQS0155I WORKLOAD WORKLOAD2 QUIESCED
```

The following example shows a sample display when you quiesce all Active/Standby workloads by issuing `F AQSADV,QUIESCE,WORKLOAD=*ALL_AS*` on the primary Advisor.

```
F AQSADV,QUIESCE,WORKLOAD=*ALL_AS*
AQS0202I ALL MATCHING WORKLOADS QUIESCED
```

---

## MODIFY *advisor\_proc*, REFRESH command: Update configuration

Use the `MODIFY advisor_proc, REFRESH` command to force the Lifeline Advisor to read the configuration file again and apply any changes to its active configuration.

See “Lifeline Advisor configuration statements” on page 47 for the configuration statements that are refreshable.

### Format

```
►► ┌───┴───┐ ┌───┴───┐
 │ MODIFY │ advisor_proc , REFRESH ───────────────────────────────────►►
 └───┬───┘
 F
```

### Parameters

*advisor\_proc*

Indicates the member name of the cataloged procedure used to start the Advisor.

### REFRESH

Forces this Advisor to read the configuration file again and apply any changes to its active configuration.

### Example

The following example shows a sample display when you issue `F AQSADV, REFRESH`.

```
F AQSADV, REFRESH
AQS0181I LLADVSR CONFIGURATION UPDATED
```

---

## MODIFY *advisor\_proc*,TAKEOVER command: Take over primary Advisor responsibilities

Use the MODIFY *advisor\_proc*,TAKEOVER command to force the Lifeline Advisor to take over primary Advisor responsibilities.

**Rule:** You can issue this command only from the secondary Advisor.

### Format

►► `MODIFY advisor_proc,TAKEOVER` ◀◀  
└─┬─┘  
  F

### Parameters

*advisor\_proc*

Indicates the member name of the cataloged procedure used to start the Advisor.

### TAKEOVER

Forces this Advisor to takeover primary Advisor responsibilities.

### Example

The following example shows a sample display when you issue F AQSADV,TAKEOVER on the secondary Advisor.

```
F AQSADV,TAKEOVER
AQS0169I ADVISOR TAKEOVER SCHEDULED
AQS0166I ADVISOR IS NOW IN PRIMARY ROLE
```



---

## Chapter 8. Lifeline Agent commands

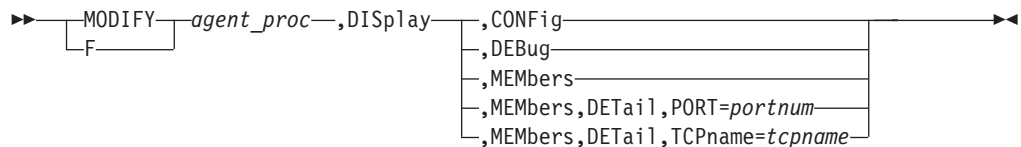
Use the Lifeline Agent commands to display Lifeline Agent information and modify Lifeline Agent state information.

---

### MODIFY *agent\_proc*,DISplay command: Display Lifeline Agent information

Use the MODIFY *agent\_proc*,DISplay command to display Lifeline Agent information.

#### Format



#### Parameters

*agent\_proc*

Indicates the member name of the cataloged procedure used to start the Agent.

**DISplay,CONFig**

Displays the active configuration for this Agent.

**DISplay,DEBUg**

Displays the debug level in effect for this Agent.

The debug level displayed is the sum of one or more levels of debug messages being logged. See “Debug levels” on page 35 for more information about the debug levels.

**DISplay,MEMbers**

Displays information about registered local server applications.

**DISplay,MEMbers,DETAil**

Displays detailed information about registered local server applications, including the job name and ASID of the server application.

**DISplay,MEMbers,DETAil,PORT=portnum**

Displays detailed information about registered local server applications that are bound to the specified port number. The valid range of the *portnum* is 0 - 65535.

**DISplay,MEMbers,DETAil,TCPname=tcpname**

Displays detailed information about registered local server applications that are associated with the specified TCP/IP stack. The *tcpname* value must be less than or equal to 8 characters in length.

#### Examples

The following example shows a sample display when you issue F AQSAGE,DISPLAY,CONFIG.

```

F AQSAGE,DISPLAY,CONFIG
AQS0144I AGENT CONFIGURATION
VERSION : LIFELINE V2.0
CONFIG FILENAME : USER.PROFILES(LBAGECNF)
DEBUG LEVEL : 7
ADVISOR ID : 192.10.1.1..8181
HOST CONNECTION : 192.10.110.1..4000

```

The following information describes the fields in the previous sample display.

**Field name**

**Descriptions**

**VERSION**

The current version and release of the Agent.

**CONFIG FILENAME**

The configuration file used by this Agent when the Agent was initially started.

**DEBUG LEVEL**

The debug level currently in effect for this Agent.

**ADVISOR ID**

The IP address and port number that the primary Advisor listens on for connections from this Agent. The IP address can be an IPv4 or an IPv6 address.

**HOST CONNECTION**

The source IP address and port number that this Agent uses to connect to the primary Advisor. The IP address can be an IPv4 or an IPv6 address.

The following example shows a sample display when you issue F AQSAGE,DISPLAY,DEBUG.

```

F AQSAGE,DISPLAY,DEBUG
AQS0111I LLAGENT DEBUG LEVEL 7

```

The following example shows a sample display when you issue F AQSAGE,DISPLAY,MEMBERS.

```

F AQSAGE,DISPLAY,MEMBERS
AQS0114I MEMBER SUMMARY
LB INDEX : 00 UUID : A67B6699
GROUP NAME : WKLD2_GROUP1
IPADDR..PORT : 10.10.1.1..8020
MATCHES : 001 PROTOCOL : TCP
FLAGS : ANY DISTDVIPA
GROUP NAME : WKLD2_GROUP2
IPADDR..PORT : 10.10.1.1..8021
MATCHES : 000 PROTOCOL : TCP
FLAGS : DISTDVIPA
LB INDEX : 01 UUID : 9A78BE9E
GROUP NAME : TIER2_GROUP1
IPADDR..PORT : 192.10.110.1..5001
MATCHES : 001 PROTOCOL : TCP
FLAGS :
GROUP NAME : TIER2_GROUP2
IPADDR..PORT : 192.10.110.1..6001
MATCHES : 001 PROTOCOL : TCP
FLAGS :
4 OF 4 RECORDS DISPLAYED

```

The following information describes the fields in the previous sample display.

**Field name****Descriptions****LB INDEX**

The reference number used to identify the load balancer. The same reference number is used for a load balancer as long as the load balancer remains connected.

**UUID** A hexadecimal value of the universally unique identifier assigned by the load balancer. This byte array can be up to 64 bytes in length. Only one load balancer with the same UUID can be connected to the primary Advisor at the same time.

**GROUP NAME**

The name of a group of related target server applications registered on the external load balancer.

**IPADDR..PORT**

The IP address and port number of a member defined in the registered group. The IP address can be an IPv4 or an IPv6 address.

**MATCHES**

The number of server applications that match the IP address and port number. For the server applications sharing a port, this value can be more than 1. If the value of matches is 0, the Agent finds the IP address of the member reported on an active TCP/IP stack, but does not find a server application listening on that IP address or port number.

**PROTOCOL**

The protocol that the member is using. The protocol value is TCP or UDP.

**FLAGS**

Indicators for the member. The flag values are shown as follows:

**ANY** Indicates that the server application is bound to INADDR\_ANY or the unspecified IPv6 address.

**DISTDVIPA**

Indicates that the IP address of the member is a distributable DVIPA. The IP address can be an IPv4 or an IPv6 address.

**NODATA**

Indicates that the Agent is reporting a temporary value for the Communications Server weight. Two update intervals are needed before the Agent can calculate a proper value for the Communications Server weight.

**SDQ** Indicates that an operator at the owning Agent quiesced the sysplex distributed DVIPA server application's port, jobname, or TCP/IP stack with a VARY TCPIP,,SYSPLEX,QUIESCE command. No new workload connections are routed to this server application. Use the VARY TCPIP,,SYSPLEX,RESUME command to allow new workload connections to be routed to this server application.

**SYSQ, TCPQ, or APPQ**

Indicates that the operator has requested that no more work be routed to the quiesced server application. The different flags reflect the highest level of the quiesce command that applies, and indicates the type of the enable command that must be used to enable the server application.

**SYSQ** Indicates that the server application was quiesced with the

*F\_agent\_proc*, QUIESCE, SYSTEM command, and that you must use the *F\_agent\_proc*, ENABLE, SYSTEM command to enable the server application.

**TCPQ** Indicates that the server application was quiesced with the *F\_agent\_proc*, QUIESCE, TCPNAME=*tcpname* command, and that you must use the *F\_agent\_proc*, ENABLE, TCPNAME=*tcpname* command to enable the server application.

**APPQ** Indicates that the server application was quiesced with the *F\_agent\_proc*, QUIESCE, PORT=*portnum* command, and that you must use the *F\_agent\_proc*, ENABLE, PORT=*portnum* command to enable the server application.

**V6** Indicates that the server application has specified the IPv6\_V6ONLY socket option. Only workload requests from IPv6-enabled clients are able to communicate with the server application.

The following example shows a sample display when you issue F AQSAGE, DISPLAY, MEMBERS, DETAIL.

```
F AQSAGE, DISPLAY, MEMBERS, DETAIL
AQS0115I MEMBER DETAILS
LB INDEX : 00 UUID : A67B6699
GROUP NAME : WKLD2_GROUP1
IPADDR..PORT : 10.10.1.1..8020
MATCHES : 001 PROTOCOL : TCP
FLAGS : ANY DISTDVIPA
TCPNAME : TCPIP
JOBNAME : JOB1 ASID : 0034 RESOURCE : 0000096B
GROUP NAME : WKLD2_GROUP2
IPADDR..PORT : 10.10.1.1..8021
MATCHES : 000 PROTOCOL : TCP
FLAGS : DISTDVIPA
TCPNAME : TCPIP
JOBNAME : N/A ASID : N/A RESOURCE : N/A
LB INDEX : 01 UUID : 9A78BE9E
GROUP NAME : TIER2_GROUP1
IPADDR..PORT : 192.10.110.1..5001
MATCHES : 001 PROTOCOL : TCP
FLAGS :
TCPNAME : TCPIP
JOBNAME : JOB3 ASID : 0036 RESOURCE : 0000096D
GROUP NAME : TIER2_GROUP2
IPADDR..PORT : 192.10.110.1..6001
MATCHES : 001 PROTOCOL : TCP
FLAGS :
TCPNAME : TCPIP
JOBNAME : JOB4 ASID : 0037 RESOURCE : 0000096E
4 OF 4 RECORDS DISPLAYED
```

The following information describes the fields in the previous sample display.

**Field name**

**Descriptions**

**LB INDEX**

Reference number used to identify the load balancer. The same reference number is used for a load balancer as long as the load balancer remains connected.

**UUID** A hexadecimal value of the universally unique identifier assigned by the

load balancer. This byte array can be up to 64 bytes in length. Only one load balancer with the same UUID can be connected to the primary Advisor at the same time.

#### **GROUP NAME**

The name of a group of related target server applications registered on the external load balancer.

#### **IPADDR..PORT**

The IP address and port number of a member defined in the registered group. The IP address can be an IPv4 or an IPv6 address.

#### **MATCHES**

The number of server applications that match the IP address and port number. For server applications sharing a port, this value can be more than 1. If the value of matches is 0, the Agent found the IP address of the member reported on an active TCP/IP stack, but did not find a server application listening on that IP address or port number.

#### **PROTOCOL**

The protocol that the member is using. The protocol value will be TCP or UDP.

#### **FLAGS**

Indicators for the member. The flag values are shown as follows:

**ANY** Indicates that the server application is bound to INADDR\_ANY or the unspecified IPv6 address.

#### **DISTDVIPA**

Indicates that the IP address of the member is a distributable DVIPA. The IP address can be an IPv4 or an IPv6 address.

#### **NODATA**

Indicates that the Agent is reporting a temporary value for the Communications Server weight. Two update intervals are needed before the Agent can calculate a proper value for the Communications Server weight.

#### **SYSQ, TCPQ, or APPQ**

Indicates that the operator has requested that no more work be routed to the quiesced server application. The different flags reflect the highest level of the quiesce command that applies, and indicates the type of the enable command that must be used to enable the server application.

**SYSQ** Indicates that the server application was quiesced with the *F\_agent\_proc*, QUIESCE, SYSTEM command, and that you must use the *F\_agent\_proc*, ENABLE, SYSTEM command to enable the server application.

**TCPQ** Indicates that the server application was quiesced with the *F\_agent\_proc*, QUIESCE, TCPNAME=tcpname command, and that you must use the *F\_agent\_proc*, ENABLE, TCPNAME=tcpname command to enable the server application.

**APPQ** Indicates that the server application was quiesced with the *F\_agent\_proc*, QUIESCE, PORT=portnum command, and that you must use the *F\_agent\_proc*, ENABLE, PORT=portnum command to enable the server application.

**V6** Indicates that the server application has specified the IPv6\_V6ONLY socket option. Only workload requests from IPv6-enabled clients are able to communicate with the server application.

#### **TCPNAME**

The name of the TCP/IP Server stack that owns the IP address for the member.

#### **JOBNAME**

The MVS job name of the server application. If there are no server applications matching this member, N/A is displayed.

**ASID** The MVS address space identifier of the server application. If there are no server applications matching this member, N/A is displayed.

#### **RESOURCE**

The identifier used by the TCP/IP stack that uniquely identifies one instance of the server application. The resource identifier is also displayed by the NETSTAT CONN command. If there are no server applications matching this member, N/A is displayed.

The following example shows a sample display when you issue F AQSAGE,DISPLAY,MEMBERS,DETAIL,PORT=5001.

```
F AQSAGE,DISPLAY,MEMBERS,DETAIL,PORT=5001
AQS0115I MEMBER DETAILS
LB INDEX : 01 UUID : 9A78BE9E
GROUP NAME : TIER2_GROUP1
IPADDR..PORT : 192.10.110.1..5001
MATCHES : 001 PROTOCOL : TCP
FLAGS :
TCPNAME : TCPIP
JOBNAME : JOB3 ASID : 0036 RESOURCE : 0000096D
1 OF 1 RECORDS DISPLAYED
```

The following example shows a sample display when you issue F AQSAGE,DISPLAY,MEMBERS,DETAIL,TCPIP.

```
F AQSAGE,DISPLAY,MEMBERS,DETAIL,TCPIP
AQS0115I MEMBER DETAILS
LB INDEX : 00 UUID : A67B6699
GROUP NAME : WKLD2_GROUP1
IPADDR..PORT : 10.10.1.1..8020
MATCHES : 001 PROTOCOL : TCP
FLAGS : ANY DISTDVIPA
TCPNAME : TCPIP
JOBNAME : JOB1 ASID : 0034 RESOURCE : 0000096B
GROUP NAME : WKLD2_GROUP2
IPADDR..PORT : 10.10.1.1..8021
MATCHES : 000 PROTOCOL : TCP
FLAGS : DISTDVIPA
TCPNAME : TCPIP
JOBNAME : N/A ASID : N/A RESOURCE : N/A
LB INDEX : 01 UUID : 9A78BE9E
GROUP NAME : TIER2_GROUP1
IPADDR..PORT : 192.10.110.1..5001
MATCHES : 001 PROTOCOL : TCP
FLAGS :
TCPNAME : TCPIP
JOBNAME : JOB3 ASID : 0036 RESOURCE : 0000096D
GROUP NAME : TIER2_GROUP2
IPADDR..PORT : 192.10.110.1..6001
MATCHES : 001 PROTOCOL : TCP
```

```

 FLAGS :
 TCPNAME : TCPIP
 JOBNAME : JOB4 ASID : 0037 RESOURCE : 0000096E
4 OF 4 RECORDS DISPLAYED

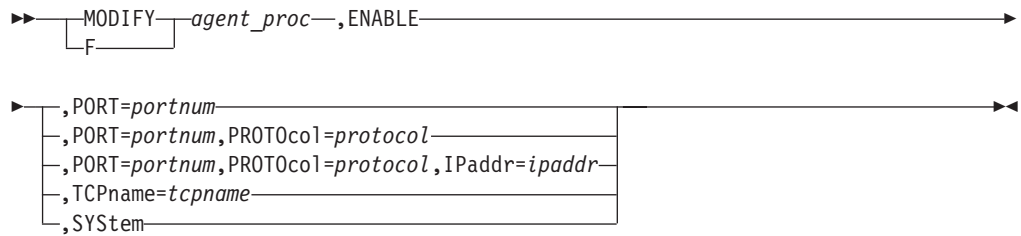
```

## MODIFY *agent\_proc*,ENABLE command: Enable server applications

Use the MODIFY *agent\_proc*,ENABLE command to mark the server applications as enabled. The Lifeline Agent will notify the Advisor to recommend this server application for new workload requests.

**Tip:** If more than one server application is sharing a port, all of the server applications are enabled.

### Format



### Parameters

#### *agent\_proc*

Indicates the member name of the cataloged procedure used to start the Agent.

#### ENABLE,PORT=*portnum*

Marks the server applications bound to the specified port number as enabled. The range of the *portnum* value is 0 - 65535.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can enable the server applications only by the VARY TCPIP,,SYSPLEX,RESUME,PORT=*portnum* command.

#### ENABLE,PORT=*portnum*,PROTOcol=*protocol*

Marks the server applications that are bound to the specified port number and use the specified protocol as enabled. The range of the *portnum* value is 0 - 65535. The *protocol* value is TCP or UDP.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can enable the server applications only by the VARY TCPIP,,SYSPLEX,RESUME,PORT=*portnum* command.

#### ENABLE,PORT=*portnum*,PROTOcol=*protocol*,IPaddr=*ipaddr*

Marks the server applications that are bound to the specified port number and use the specified protocol and the specified IP address as enabled. The range of the *portnum* value is 0 - 65535. The *protocol* value is TCP or UDP. The IP address can be an IPv4 or an IPv6 address.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can enable the server applications only by the VARY TCPIP,,SYSPLEX,RESUME,JOBNAME=*jobname* command.

**ENABLE, TCPname=tcpname**

Marks the server applications associated with the specified TCP/IP stack as enabled. The *tcpname* value must be less than or equal to 8 characters in length.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can enable the server applications only by the TCP/IP, ,SYSPLEX, RESUME, TARGET command.

**ENABLE, SYStem**

Marks the server applications on this system as enabled.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can enable the server applications only by the VARY TCP/IP, ,SYSPLEX, RESUME, TARGET command.

**Examples**

The following example shows a sample display when you issue F AQSAGE, ENABLE, PORT=5001.

```
F AQSAGE, ENABLE, PORT=5001
AQS0139I ALL MATCHING REGISTERED APPLICATIONS ARE ENABLED
```

The following example shows a sample display when you issue F AQSAGE, ENABLE, PORT=8021, but the server application was registered for a distributable DVIPA.

```
F AQSAGE, ENABLE, PORT=8021
AQS0140I 0 OF 1 MATCHING REGISTERED APPLICATIONS ARE EsENABLED -
DISTRIBUTED DVIPA MEMBERS ARE IGNORED
```

The following example shows a sample display when you issue F AQSAGE, ENABLE, PORT=5001, PROTOCOL=TCP.

```
F AQSAGE, ENABLE, PORT=5001, PROTOCOL=TCP
AQS0139I ALL MATCHING REGISTERED APPLICATIONS ARE ENABLED
```

The following example shows a sample display when you issue F AQSAGE, ENABLE, PORT=8021, PROTOCOL=TCP, but the server application was registered for a distributable DVIPA.

```
F AQSAGE, ENABLE, PORT=8021, PROTOCOL=TCP
AQS0140I 0 OF 1 MATCHING REGISTERED APPLICATIONS ARE ENABLED -
DISTRIBUTED DVIPA MEMBERS ARE IGNORED
```

The following example shows a sample display when you issue F AQSAGE, ENABLE, PORT=5001, PROTOCOL=UDP, but no matching server applications are listening on this port or protocol.

```
F AQSAGE, ENABLE, PORT=5001, PROTOCOL=UDP
AQS0122I NO MEMBERS MATCH SELECTION CRITERIA
AQS0123I ENABLE APPLICATION COMMAND REJECTED
```

The following example shows a sample display when you issue F AQSAGE, ENABLE, PORT=5001, PROTOCOL=TCP, IPADDR=192.10.110.1.

```
F AQSAGE, ENABLE, PORT=5001, PROTOCOL=TCP, IPADDR=192.10.110.1
AQS0139I ALL MATCHING REGISTERED APPLICATIONS ARE ENABLED
```

The following example shows a sample display when you issue F AQSAGE, ENABLE, PORT=8021, PROTOCOL=TCP, IPADDR=10.10.1.1, but the server application was registered for a distributable DVIPA..



```
F AQSAGE,ENABLE,PORT=8021,PROTOCOL=TCP,IPADDR=10.10.1.1
AQS0140I 0 OF 1 MATCHING REGISTERED APPLICATIONS ARE ENABLED -
DISTRIBUTED DVIPA MEMBERS ARE IGNORED
```

The following example shows a sample display when you issue `F AQSAGE,ENABLE,PORT=5001,PROTOCOL=TCP,IPADDR=10.10.1.2`, but no matching server applications are listening on this port or protocol.

```
F AQSAGE,ENABLE,PORT=5001,PROTOCOL=TCP,IPADDR=10.10.1.2
AQS0122I NO MEMBERS MATCH SELECTION CRITERIA
AQS0123I ENABLE APPLICATION COMMAND REJECTED
```

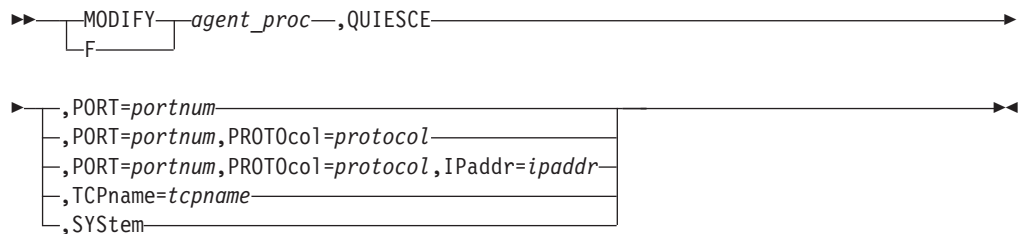
---

## MODIFY *agent\_proc*, QUIESCE command: Quiesce server applications

Use the `MODIFY agent_proc, QUIESCE` command to mark the server applications as quiesced. The Lifeline Agent will notify the Advisor to not recommend this server application for new workload requests.

**Tip:** If more than one server application is sharing a port, all of the server applications are quiesced.

### Format



### Parameters

***agent\_proc***

Indicates the member name of the cataloged procedure used to start the Agent.

**QUIESCE, PORT=*portnum***

Marks the server applications bound to the specified port number as quiesced. The range of the *portnum* value is 0 - 65535.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can quiesce the server applications only by the `VARY TCPIP, ,SYSPLEX, QUIESCE, PORT=portnum` command.

**QUIESCE, PORT=*portnum*, PROTOCOL=*protocol***

Marks the server applications that are bound to the specified port number and use the specified protocol as quiesced. The range of the *portnum* value is 0 - 65535. The *protocol* value is TCP or UDP.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can quiesce the server applications only by the `VARY TCPIP, ,SYSPLEX, QUIESCE, PORT=portnum` command.

**QUIESCE, PORT=*portnum*, PROTOCOL=*protocol*, IPADDR=*ipaddr***

Marks the server applications that are bound to the specified port number and use the specified protocol and the specified IP address as quiesced. The range of the *portnum* value is 0 - 65535. The *protocol* value is TCP or UDP. The IP address can be an IPv4 or an IPv6 address.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can quiesce the server applications only by the VARY TCPIP,,SYSPLEX,QUIESCE,JOBNAME=*jobname* command.

#### **QUIESCE, TCPname=*tcpname***

Marks the server applications associated with the specified TCP/IP stack as quiesced. The *tcpname* value must be less than or equal to 8 characters in length.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can quiesce the server applications only by the VARY TCPIP,,SYSPLEX,QUIESCE,TARGET command.

#### **QUIESCE, SYSTEM**

Marks the server applications on this system as quiesced.

**Rule:** If the IP address of the member is a distributable DVIPA when you specify this parameter, you can quiesce the server applications only by the VARY TCPIP,,SYSPLEX,QUIESCE,TARGET command.

## **Examples**

The following example shows a sample display when you issue F AQSAGE,QUIESCE,PORT=5001.

```
F AQSAGE,QUIESCE,PORT=5001
AQS0139I ALL MATCHING REGISTERED APPLICATIONS ARE QUIESCED
```

The following example shows a sample display when you issue F AQSAGE,QUIESCE,PORT=8021, but the server application was registered for a distributable DVIPA.

```
F AQSAGE,QUIESCE,PORT=8021
AQS0140I 0 OF 1 MATCHING REGISTERED APPLICATIONS ARE QUIESCED -
DISTRIBUTED DVIPA MEMBERS ARE IGNORED
```

The following example shows a sample display when you issue F AQSAGE,QUIESCE,PORT=5001,PROTOCOL=TCP.

```
F AQSAGE,QUIESCE,PORT=5001,PROTOCOL=TCP
AQS0139I ALL MATCHING REGISTERED APPLICATIONS ARE QUIESCED
```

The following example shows a sample display when you issue F AQSAGE,QUIESCE,PORT=8021,PROTOCOL=TCP, but the server application was registered for a distributable DVIPA.

```
F AQSAGE,QUIESCE,PORT=8021,PROTOCOL=TCP
AQS0140I 0 OF 1 MATCHING REGISTERED APPLICATIONS ARE QUIESCED -
DISTRIBUTED DVIPA MEMBERS ARE IGNORED
```

The following example shows a sample display when you issue F AQSAGE,QUIESCE,PORT=5001,PROTOCOL=UDP, but no matching server applications are listening on this port or protocol.

```
F AQSAGE,QUIESCE,PORT=5001,PROTOCOL=UDP
AQS0122I NO MEMBERS MATCH SELECTION CRITERIA
AQS0123I QUIESCE APPLICATION COMMAND REJECTED
```

The following example shows a sample display when you issue F AQSAGE,QUIESCE,PORT=5001,PROTOCOL=TCP,IPADDR=192.10.110.1.

```
F AQSAGE,QUIESCE,PORT=5001,PROTOCOL=TCP,IPADDR=192.10.110.1
AQS0139I ALL MATCHING REGISTERED APPLICATIONS ARE QUIESCED
```

The following example shows a sample display when you issue F AQSAGE, QUIESCE, PORT=8021, PROTOCOL=TCP, IPADDR=10.10.1.1, but the server application was registered for a distributable DVIPA.

```
F AQSAGE, QUIESCE, PORT=8021, PROTOCOL=TCP, IPADDR=10.10.1.1
AQS0140I 0 OF 1 MATCHING REGISTERED APPLICATIONS ARE QUIESCED -
DISTRIBUTED DVIPA MEMBERS ARE IGNORED
```

The following example shows a sample display when you issue F AQSAGE, QUIESCE, PORT=5001, PROTOCOL=TCP, IPADDR=10.10.1.2, but no matching server applications are listening on this port or protocol.

```
F AQSAGE, QUIESCE, PORT=5001, PROTOCOL=TCP, IPADDR=10.10.1.2
AQS0122I NO MEMBERS MATCH SELECTION CRITERIA
AQS0123I QUIESCE APPLICATION COMMAND REJECTED
```

The following example shows a sample display when you issue F AQSAGE, QUIESCE, TCPNAME=TCPIP.

```
F AQSAGE, QUIESCE, TCPNAME=TCPIP
AQS0140I 2 OF 4 MATCHING REGISTERED APPLICATIONS ARE QUIESCED -
DISTRIBUTED DVIPA MEMBERS ARE IGNORED
```

The following example shows a sample display when you issue F AQSAGE, QUIESCE, SYSTEM, but two of the server applications were registered for a distributable DVIPA.

```
F AQSAGE, QUIESCE, SYSTEM
AQS0140I 2 OF 4 MATCHING REGISTERED APPLICATIONS ARE QUIESCED -
DISTRIBUTED DVIPA MEMBERS ARE IGNORED
```

---

## MODIFY *agent\_proc*, DEBug command: Change the debug level

Use the MODIFY *agent\_proc*, DEBug command to change the debug level that is in effect for the Lifeline Agent.

### Format

```
➤┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐ ┌───┴───┐
 MODIFY agent_proc, DEBug ,Level=debuglevel
└───┬───┘ └───┬───┘ └───┬───┘ └───┬───┘ └───┬───┘ └───┬───┘ └───┬───┘ └───┬───┘ └───┬───┘ └───┬───┘
 F
```

### Parameters

*agent\_proc*

Indicates the member name of the cataloged procedure used to start the Agent.

DEBug, Level=*debuglevel*

Changes the debug level in effect for this Agent. The debug level that you can set is the sum of one or more levels of the debug messages to be logged. See “Debug levels” on page 35 for debug level values.

### Example

The following example shows a sample display when you issue F AQSAGE, DEBUG, LEVEL=127.

```
F AQSAGE, DEBUG, LEVEL=127
AQS0138I LLAGENT DEBUG LEVEL UPDATED
```

---

## MODIFY *agent\_proc*,DUMPLog command: Dump the internal debug records

Use the MODIFY *agent\_proc*,DUMPLog command to dump the internal debug records to the HFS file specified by the AQSTRACE DD card in the Agent started procedure.

### Format

►► ————┐ MODIFY *agent\_proc* ————,DUMPLog ————►►  
         └──┬──┘  
          F

### Parameters

*agent\_proc*

Indicates the member name of the cataloged procedure used to start the Agent.

**DUMPLog**

Signals the Agent that the internal debug records need to be dumped. Any existing data in the target HFS file will be overwritten.

### Example

The following example shows a sample display when you issue F AQSSAGE,DUMPLOG.

```
F AQSSAGE,DUMPLOG
AQS0204I LLAGENT INTERNAL LOG DUMPED
```

---

## Chapter 9. Network Management Interface for Multi-site Workload Lifeline

Multi-site Workload Lifeline provides a Network Management Interface (NMI) that you can use to monitor Lifeline metrics and statistics. Network management applications can communicate with the Lifeline NMI through an AF\_UNIX socket by using a series of messages.

The flow between the Lifeline NMI and the network management application is described in Figure 4.

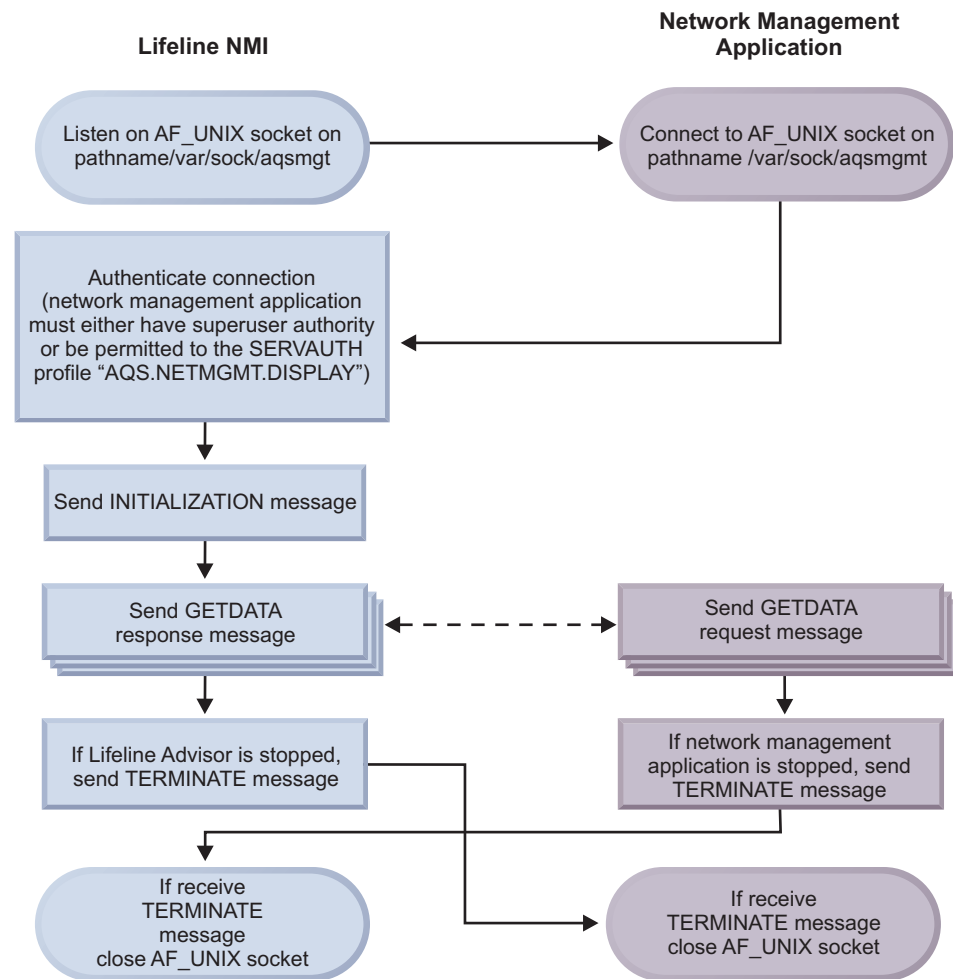


Figure 4. Flow between the Lifeline NMI and the network management application

There are three possible message types: initialization message, data message, and termination message. The initialization and termination message contain only a message header. The data message is either a request or a response. A data request message contains only a message header.

The data response message contains the following headers and section descriptors:

1. A message header.

2. A record header for the overall response.
3. A section descriptor for Lifeline Advisors, which maps one section for the primary Advisor, and optionally, one section for the secondary Advisor.
4. A section descriptor for workloads, which maps sections for each of the defined workloads.
5. A section descriptor for sites, which maps sections for each of the defined sites.
6. A section descriptor for Lifeline Agents, which maps each of the Agents that connect to the primary Advisor.
7. A section descriptor for load balancers, which maps each of the load balancers (either external or z/OS sysplex distributor) that connect to the primary Advisor.
8. A section descriptor for load balancer groups, which maps the groups that are defined to external load balancers.
9. A section descriptor for load balancer group IP addresses, which maps the IP addresses that are configured for a specific load balancer group.
10. A section descriptor for servers, which maps all the servers that make up each of the defined workloads.

Figure 5 describes the layout of the data response message.

|                                                                                                   |
|---------------------------------------------------------------------------------------------------|
| Message Header                                                                                    |
| Record Header for Response                                                                        |
| Section Descriptor for Lifeline Advisors                                                          |
| Section Descriptor for Workloads                                                                  |
| Section Descriptor for Sites                                                                      |
| Section Descriptor for Agents                                                                     |
| Section Descriptor for Load Balancers                                                             |
| Section Descriptor for Load Balancer Groups                                                       |
| Section Descriptor for Load Balancer Group IP Addresses                                           |
| Section Descriptor for Servers                                                                    |
| Lifeline Advisor Sections (one for primary Advisor, and<br>one for secondary Advisor – if active) |
| Zero or more Workload Sections                                                                    |
| Zero or more Sites Sections                                                                       |
| Zero or more Lifeline Agent Sections                                                              |
| Zero or more Load Balancer Sections (both external and<br>Sysplex Distributor load balancers)     |
| Zero or more Load Balancer Group Sections                                                         |
| Zero or more Load Balancer Group IP Address Sections                                              |
| Zero or more Server Sections                                                                      |

Figure 5. Layout of the data response message

Use the record header descriptor in the message header to locate the response record header. You can locate the offset of the first section descriptor through the header. All eight section descriptors are contiguous. You can locate the data for each of the sections through the respective section descriptor. See “NMI message format” for more details about the layout of the NMI messages.

## NMI message format

The following information shows the format of an NMI message.

```

/*
** Message Header
*/
typedef struct _AQSMMessageHdr {
 char MsgHdrID[4]; /* Identifier for Message Header */
#define AQSMMessageHdrID "AQSM"
 unsigned int MsgHdrLength; /* Length of message header */
 unsigned short MsgHdrVersion; /* Interface version */
#define AQSVersion1 1
#define AQSVersion2 2
#define AQSVersion 2
 unsigned short MsgHdrType; /* Message type */
#define AQSInitType 1
#define AQSTermType 2
#define AQSGetDataType 3
 char MsgHdrRsvd1[4]; /* Reserved – set to 0 */
 char MsgHdrCorrelator[16]; /* User-defined correlator */
 unsigned int MsgHdrRc; /* Return code */
#define AQSRcOK 0
#define AQSRcError 8
 unsigned int MsgHdrRsn; /* Reason code */
#define AQSBadID 1
#define AQSBadVersion 2
#define AQSBadType 3
#define AQSBadSize 4
#define AQSBadFields 5
#define AQSConnsExceeded 6
#define AQSInternalError 7
#define AQSNotAuth 8
 unsigned int MsgHdrMsgLength; /* Message length (including header) */
 unsigned int MsgHdrTime; /* Timestamp when message was created */
 char MsgHdrRsvd2[16]; /* Reserved – set to 0 */
 AQSRecordDesc MsgHdrRecDesc; /* Record Descriptor – only
 meaningful for GETDATA responses */
} AQSMMessageHdr;
/*
** Section Correlator
*/
typedef struct _AQSCorrelator {
 char SecID[4]; /* Identifier for the section */
 unsigned int SecInstance; /* Instance count of this section */
} AQSCorrelator;

#define AQSAAdvisorID "AQSA"
#define AQSWorkloadID "AQSW"
#define AQSSiteID "AQSI"
#define AQSAgentID "AQSC"
#define AQSLoadBalancerID "AQSL"
#define AQSGroupID "AQSG"
#define AQSGrpIPID "AQSP"
#define AQSServerID "AQSS"
/*
** Message Section for Lifeline Advisors (1st section)
*/
typedef struct _AQSAAdvisorSec {
 AQSCorrelator AdvCorr; /* Advisor correlator */
 struct in_addr AdvIpAddr4; /* Advisor's IPv4 Address */
 struct in6_addr AdvIpAddr6; /* Advisor's IPv6 Address */
 char AdvSysName[8]; /* System Name where Advisor resides */
 unsigned char AdvRole; /* Advisor role */
#define AQSAAdvisorPrimary 1
#define AQSAAdvisorSecondary 2
 char AdvRsvd[3]; /* Reserved – set to 0 */
} AQSAAdvisorSec;
/*
** Message Section for Workloads (2nd section)

```

```

*/
typedef struct _AQSWorkloadSec {
 AQSCorrelator WkldCorr; /* Workload correlator */
 char WkldWorkloadName[64]; /* Name of workload */
 unsigned char WkldStatus; /* Routing status of workload */
#define AQSWorkloadOk 1 /* Site and servers for workload
 are available */
#define AQSWorkloadNotOk 2 /* Site or servers for workload
 are not available */
 char WkldRsvd[3]; /* Reserved – set to 0 */
} AQSWorkloadSec;
/*
typedef struct _AQSWorkloadSecAQ {
 unsigned char WkldType; /* Workload type */
#define AQSWkldTypeAS 1 /* Active/Standby workload */
#define AQSWkldTypeAQ 2 /* Active/Query workload */
 unsigned char WkldDistType; /* Workload distribution type for
 Active/Query workloads */
#define AQSWkldTypeNotUsed 0 /* Active/Standby workload */
#define AQSWkldTypeStatic 1 /* Static distribution */
#define AQSWkldTypeDynamic 2 /* Dynamic distribution */
 char WkldRsvd2[2]; /* Reserved – set to 0 */
 AQSCorr_t WkldAssocWorkload; /* For Active/Query workload,
 correlator of the associated
 Active/Standby workload */
 unsigned short WkldAssocNum; /* For Active/Standby workload,
 the number of Active/Query
 workloads associated with this
 workload */
 char WkldRsvd3[2]; /* Reserved – set to 0 */
 unsigned int WkldLatencyFlags; /* For Active/Query workload,
 the current replication latency
 state */
#define AQSWkldLatencyAcute 0x00000001 /* Acute latency state */
#define AQSWkldLatencyNormal 0x00000002 /* Normal latency state */
#define AQSWkldLatencyConstrained 0x00000004 /* Constrained latency state */
#define AQSWkldLatencyCritical 0x00000008 /* Critical latency state */
#define AQSWkldLatencyUnknown 0x00000010 /* Unknown latency state */
 unsigned int WkldStatusRsn; /* Reason for WkldStatus
 set to NotOk */
#define AQSWkldStatusOk 1 /* Workload ok */
#define AQSWkldStatusQuiesced 2 /* Workload quiesced */
#define AQSWkldStatusWorkFailure 3 /* Workload failed */
#define AQSWkldStatusSiteFailure 4 /* Site failed */
#define AQSWkldStatusRouting 5 /* Routing not optimal */
} AQSWorkloadSecAQ;

typedef struct _AQSWorkloadSecV2 {
 AQSWorkloadSec AQSWorkloadSection1; /* Base definitions */
 AQSWorkloadSecAQ AQSWorkloadSection2; /* Active/Query workload section */
} AQSWorkloadSecV2;
*/
** Message Section for Sites (3rd section)
*/
typedef struct _AQSSiteSec {
 AQSCorrelator SiteIdCorr; /* Site correlator*/
 AQSCorrelator SiteWkldCorr; /* Correlator for workload this
 Site section maps to */
 char SiteRsvd1[16]; /* Reserved – set to 0 */
 char SiteName[8]; /* Name of site (i.e. sysplex name)
 */
 unsigned char SiteWorkloadState; /* Routing state of workload */
#define AQSSiteWorkloadActive 1 /* Workload is active on this site
 */
#define AQSSiteWorkloadQuiesce 2 /* Workload is quiesced on this site
 */
 char SiteRsvd2[3]; /* Reserved – set to 0 */
 unsigned short SiteWeight; /* Routing weight for the
 workload on this site */
 char SiteRsvd3[2]; /* Reserved – set to 0 */
} AQSSiteSec;

typedef struct _AQSSiteSecAQ {
 unsigned int SitePercentWeight; /* For static routing,
 percent of connections
 to be routed to this
 site; otherwise 0 */
 unsigned int SitePreferredFlag; /* For dynamic routing,
 indicator on whether this
 is the preferred site;
 otherwise 0 */
#define AQSSiteNotPreferred 1 /* Not the preferred site */
}

```



```

#define AQSSitePreferred 2 /* The preferred site */
char SiteReserved2[3]; /* Reserved – set to 0 */
} AQSSiteSectionAQ;

typedef struct _AQSSiteSectionV2 {
 AQSSiteSection AQSSiteSection1; /* Base definitions */
 AQSSiteSectionAQ AQSSiteSection2; /* Active/Query workload section */
} AQSSiteSectionV2;

/*
** Message Section for Lifeline Agents (4th section)
*/
typedef struct _AQSAgentSec {
 AQSCorrelator AgntCorr; /* Correlator for Agent */
 union {
 struct in_addr in; /* Agent's IPv4 address */
 struct in6_addr in6; /* Agent's IPv6 address */
 } AgntIpAddr;
 char AgntSysName[8]; /* System name where Agent resides */
 char AgntSiteName[8]; /* Name of site (i.e. sysplex name
 where Agent resides */
 unsigned char AgntState; /* State of Agent */
#define AQSAgentActive 1 /* Agent is active */
#define AQSAgentInactive 2 /* Agent is inactive */
 char AgntRsvd[1]; /* Reserved – set to zero */
 unsigned short AgntFlags; /* Agent flags */
#define AQSAgentIPv4 1 /* AgntIpAddr is IPv4 address */
} AQSAgentSec;

/*
** Message Section for Load Balancers (5th section)
*/
typedef struct _AQSLBSec {
 AQSCorrelator LBCorr; /* Correlator for Load Balancer */
 union {
 struct in_addr in; /* Load Balancer's IPv4 address */
 struct in6_addr in6; /* Load Balancer's IPv6 address */
 } LBIPAddr;
 unsigned char LBTier; /* Load Balancer Tier */
#define AQSLoadBalancerTier1 1 /* First-tier Load Balancer */
#define AQSLoadBalancerTier2 2 /* Second-tier Load Balancer */
#define AQSLoadBalancerTierUnk 3 /* Unknown tier */
 unsigned char LBState; /* State of load balancer */
#define AQSLoadBalancerActive 1 /* Load balancer is active */
#define AQSLoadBalancerInactive 2 /* Load balancer is not active */
 unsigned short LBFlags; /* Load balancer flags */
#define AQSLoadBalancerInt 1 /* Internal load balancer (i.e.
 Sysplex Distributor) */
#define AQSLoadBalancerIPv4 2 /* LBIPAddr is IPv4 address */
 char LBRsvd[8]; /* Reserved – set to zero */
} AQSLBSec;

/*
** Message Section for Groups (6th section)
*/
typedef struct _AQSGroupSec {
 AQSCorrelator GrpCorr; /* Correlator for Group */
 AQSCorrelator GrpLBCorr; /* Correlator for Load Balancer
 this group is defined to */
 AQSCorrelator GrpWkldCorr; /* Correlator for Workload this
 group belongs to */
 unsigned short GrpPortNum; /* Port number for the servers
 configured for this group */
 char GrpName[255]; /* Group name */
 unsigned short GrpFlags; /* Group flags */
#define AQSGroupInt 1 /* Simulated group for internal load
 balancers (i.e. Sysplex Distributor) -
 there is not a corresponding GroupIP
 section for this group */
 char GrpRsvd[1]; /* Reserved – set to zero */
} AQSGroupSec;

/*
** Message Section for Group IP Addresses (7th section)
*/
typedef struct _AQSGrpIpSec {
 AQSCorrelator GrpIpCorr; /* Correlator for GrpIp */
 AQSCorrelator GrpIpGrpCorr; /* Correlator for Load Balancer
 Group this IP Address is
 defined to */
 union {
 struct in_addr in; /* IPv4 address for a server
 configured for this group */
 }

```

```

 struct in6_addr in6; /* IPv6 address for a server
 configured for this group */
} GrpIpAddr;
unsigned short GrpIpFlags; /* Group IP flags */
#define AQSGrpIPv4 1 /* GrpIpAddr is IPv4 address */
char GrpIpRsvd[2]; /* Reserved – set to zero */
} AQSGrpIpSec;
/*
** Message Section for Servers (8th section)
*/
typedef struct _AQSServerSec {
 AQSCorrelator SrvrCorr; /* Correlator for Server */
 AQSCorrelator SrvrLBCorr; /* Correlator for Load Balancer this
 server is defined to */
 AQSCorrelator SrvrWkldCorr; /* Correlator for Workload this
 server belongs to */
 union {
 struct in_addr in; /* Server's IPv4 address */
 struct in6_addr in6; /* Server's IPv6 address */
 } SrvrIpAddr;
 char SrvrJobName[8]; /* The MVS jobname of server */
 char SrvrSysName[8]; /* System name where server resides */
 char SrvrSiteName[8]; /* Name of site (i.e. sysplex
 where server resides */
 unsigned int SrvrNormWeight; /* Net weight for this server
 relative to other servers on this
 site - calculated by applying CS
 health as percentage of WLM
 weight for this server */
 unsigned int SrvrWlmWeight; /* ServerWLM weight for this
 server - measure of how well
 server is meeting its WLM
 policies and represents the
 displaceable processor capacity
 based on server's importance
 relative to other servers on this
 site */
 unsigned int SrvrAbTerms; /* Server abnormal terminations –
 number of abnormal transaction
 completions per 1000
 transactions */
 unsigned int SrvrHealth; /* Health indicator for server –
 used to adjust the reported
 ServerWLM weight */
 unsigned int SrvrCPUWeight; /* CPU factor in WLM weight –
 amount of displaceable general
 CPU capacity based on server's
 importance relative to other
 servers on this site and
 modified by proportion of
 general CPU capacity being
 consumed compared to zAAP
 and zIIP processors */
 unsigned int SrvrzAAPWeight; /* zAAP factor in WLM weight –
 amount of displaceable zAAP
 capacity based on server's
 importance relative to other
 servers on this site and modified
 by proportion of zAAP capacity
 being consumed compared to
 general CPU and zIIP
 processors */
 unsigned int SrvrzIIPWeight; /* zIIP factor in WLM weight –
 amount of displaceable zIIP
 capacity based on server's
 importance relative to other
 servers on this site and modified
 by proportion of zIIP capacity
 being consumed compared to
 general CPU and zAAP
 processors */
 unsigned int SrvrCSHealth; /* Health of server from a
 Communications Server
 perspective – calculated based
 on how well server is keeping up
 with connections in backlog, how
 well it is establishing new
 connections, and whether the
 server is dropping connections */
 unsigned short SrvrPortNum; /* Port number where server is */

```

```
 unsigned short SrvrFlags; /* listening */
#define AQSServerIPv4 1 /* Server flags */
 unsigned char SrvrState; /* SrvrIPAddr is Ipv4 address */
#define AQSServerUp 1 /* State of server */
#define AQSServerDown 2 /* Server is up */
 char SrvrRsvd[3]; /* Server is down */
} AQSServerSec; /* Reserved – set to zero */
```



---

## Chapter 10. Multi-site Workload Lifeline messages

---

### AQS0001I MULTI-SITE WORKLOAD LIFELINE REQUIRES THE TCP/IP BASE FEATURE OF z/OS

**Explanation:** The Multi-site Workload Lifeline function is disabled because the TCP/IP base feature of z/OS is not enabled.

**System action:** Processing ends.

**Operator response:** Contact the system programmer.

**System programmer response:** The IFAPRDxx parmlib member specifies whether or not the TCP/IP base feature is enabled. Correct the IFAPRDxx parmlib member if it is in error. IBM has defined the appropriate product enablement settings in the IFAPRD00 member of SYS1.IBM.PARMLIB.

If TCP/IP\_BASE is not part of your system, no action is required; the Multi-site Workload Lifeline function cannot be used.

**Module:** AQSUTUTI

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

---

### AQS0004I *applname* IS NOT SUPPORTED IN THIS ENVIRONMENT

**Explanation:** The Multi-site Workload Lifeline application was started in an unsupported environment. It is supported only in the z/OS UNIX shell or batch environments.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

**System action:** Processing ends.

**Operator response:** Start the Multi-site Workload Lifeline Advisor or Agent in a supported environment.

**System programmer response:** None.

**Module:** AQSUTUTI

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0004I LLADVSR IS NOT SUPPORTED IN THIS ENVIRONMENT

---

### AQS0005I *applname* MUST BE APF-AUTHORIZED

**Explanation:** The Multi-site Workload Lifeline application requires APF authorization to function correctly, but the application was not running as APF authorized.

In the message text:

## AQS0006I • AQS0007I

### *applname*

The application name. Possible values are:

#### LLADVSR

For the Multi-site Workload Lifeline Advisor

#### LLAGENT

For the Multi-site Workload Lifeline Agent

**System action:** Processing ends.

**Operator response:** Contact the system programmer to ensure that the Advisor or Agent was installed correctly.

**System programmer response:** Ensure that the Advisor or Agent was installed correctly. If the Advisor or Agent executable application resides in the z/OS UNIX file system, ensure that the APF-authorized attribute is on. If the Advisor or Agent resides in a load module, ensure that the library that contains it is APF authorized.

**Module:** AQSUTUTI

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### **Example:**

AQS0005I LLADVSR MUST BE APF-AUTHORIZED

---

### AQS0006I MESSAGE CATALOG *filename* COULD NOT BE OPENED – DEFAULT MESSAGES WILL BE USED

**Explanation:** The Multi-site Workload Lifeline message catalog file could not be opened. The command will use the default message strings instead of the message strings in the message catalog file.

In the message text:

### *filename*

The name of the message catalog that could not be opened.

**System action:** Processing continues.

**Operator response:** Contact the system programmer.

**System programmer response:** Ensure that the message catalog was installed properly. If the message catalog is installed in a location other than the default, verify the NLSPATH and LANG environment variables are correctly defined in your Lifeline Advisor and Lifeline Agent started procedures.

**Module:** AQSUTUTI

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### **Example:**

AQS0006I MESSAGE CATALOG aqs11msg.cat COULD NOT BE OPENED – DEFAULT MESSAGES WILL BE USED

---

### AQS0007I MESSAGE CATALOG *filename* AT INCORRECT SERVICE LEVEL - DEFAULT MESSAGES WILL BE USED

**Explanation:** The Multi-site Workload Lifeline message catalog is not at the same service level as the Lifeline Advisor or Lifeline Agent. The Lifeline application will use the default message strings instead of the message strings in the message catalog.

In the message text:

### *filename*

The name of the message catalog that could not be used.

**System action:** Processing continues.

**Operator response:** Contact the system programmer.

**System programmer response:** Ensure that the correct service level of the message catalog was installed. If the updated message catalog was installed in a location other than the default location, verify that the NLSPATH and LANG environment variables are correctly defined in your Lifeline Advisor and Lifeline Agent started procedures.

**Module:** AQSUTUTI

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0007I MESSAGE CATALOG aqs11msg.cat AT INCORRECT SERVICE LEVEL - DEFAULT MESSAGES WILL BE USED

#### AQS0008I AGENT UNABLE TO PROCESS DEACTIVATE COMMANDS

**Explanation:** The Multi-site Workload Lifeline Agent issues this message when it does not have authority to drop connections as a result of a DEACTIVATE command issued from the Lifeline Advisor.

**System action:** Processing continues.

**Operator response:** Contact the system programmer.

**System programmer response:** Using the SAF product on your system, ensure the following:

- The OPERCMDS class is active.
- The MVS.VARY.TCPIP.DROP profile is defined.
- The Lifeline Agent has CONTROL access to this profile.

When the errors are corrected, stop and restart the Lifeline Agent. See “Authorizing the Lifeline Agents to reset active connections” on page 15 for more information about configuring the correct authorization.

**Module:** LAMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

#### AQS0101I *applname* STARTING

**Explanation:** The Multi-site Workload Lifeline application is starting.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LAMAIN, LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

## AQS0102I • AQS0103I

### Example:

AQS0101I LLADVSR STARTING

---

**AQS0102I** *applname* **INITIALIZATION COMPLETE**

**Explanation:** The Multi-site Workload Lifeline application completed initialization.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LAMAIN, LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### Example:

AQS0102I LLADVSR INITIALIZATION COMPLETE

---

**AQS0103I** *applname* **SHUTDOWN IN PROGRESS**

**Explanation:** The Multi-site Workload Lifeline application is shutting down in response to a STOP command.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LAMAIN, LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### Example:

AQS0103I LLADVSR SHUTDOWN IN PROGRESS

---



---

**AQS0104I** *applname* SHUTDOWN COMPLETE

**Explanation:** The Multi-site Workload Lifeline application ended in response to a STOP command.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

**System action:** Processing ends.

**Operator response:** None.

**System programmer response:** None.

**Module:** LAMAIN, LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0104I LLADVSR SHUTDOWN COMPLETE

---

**AQS0105I** *applname* CONFIGURATION ERRORS DETECTED

**Explanation:** The configuration file for the Multi-site Workload Lifeline application cannot be opened, or contains one or more errors.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

**System action:** Processing ends.

**Operator response:** Contact the system programmer.

**System programmer response:** If syslogd was started, examine the syslogd file for configuration error messages. The syslogd identifier is lladvsr for the Advisor and llagent for the Agent. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and examine the internal log messages for configuration error messages. Correct the configuration file errors and restart the application. See Chapter 6, "Multi-site Workload Lifeline configuration statements," on page 47 for more information about configuration statements and parameters.

**Module:** LACONFIG, LMCONFIG

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0105I LLADVSR CONFIGURATION ERRORS DETECTED

---

**AQS0106I ADVISOR REFRESH ERRORS DETECTED**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,REFRESH command when the Advisor configuration file contains changes to statements that cannot be refreshed.

**System action:** The MODIFY command is ignored.

**Operator response:** Contact the system programmer.

**System programmer response:** If syslogd was started, examine the syslogd file for configuration error messages. The syslogd identifier is lladvr for the Advisor. Otherwise, if the AQSTRACE DD card was specified in the Advisor started procedure, dump and examine the internal log messages for configuration error messages. Correct the configuration file errors and reissue the MODIFY *procname*,REFRESH command. See Chapter 6, "Multi-site Workload Lifeline configuration statements," on page 47 for more information about configuration statements and parameters.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

---

**AQS0107I *applname* MODIFY COMMAND SYNTAX ERROR AT *location***

**Explanation:** The Multi-site Workload Lifeline application detected a syntax error on a MODIFY command.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

*location*

The portion of the MODIFY command that is not syntactically valid.

**System action:** The MODIFY command is rejected.

**Operator response:** If syslogd was started, examine the syslogd file to determine why the MODIFY command failed. The syslogd identifier is lladvr for the Advisor and llagent for the Agent. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and examine the internal log messages to determine why the MODIFY command failed. Re-enter the MODIFY command using the valid syntax. See Chapter 7, "Lifeline Advisor commands," on page 69 and Chapter 8, "Lifeline Agent commands," on page 93 for more information.

**System programmer response:** None.

**Module:** LACMD, LCCMD, LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0107I LLADVSR MODIFY COMMAND SYNTAX ERROR AT 'BAD'

---

**AQS0108I *applname* MODIFY COMMAND PARAMETER *parm* INCORRECT VALUE *value***

**Explanation:** The Multi-site Workload Lifeline application detected an incorrect value for a parameter on a MODIFY command.

In the message text:

*applname*

The application name. Possible values:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

*parm*

The name of the MODIFY command parameter that is in error.

*value*

The incorrect value entered on the MODIFY command.

**System action:** The MODIFY command is rejected.

**Operator response:** Re-enter the MODIFY command with a valid value for the indicated parameter. See Chapter 7, "Lifeline Advisor commands," on page 69 and Chapter 8, "Lifeline Agent commands," on page 93 for more information.

**System programmer response:** None.

**Module:** LCCMD, LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

```
AQS0108I LLADVSR MODIFY COMMAND PARAMETER LEVEL INCORRECT VALUE 2000
```

**AQS0109I** *syscall* **CALL FAILED** *errno/errnojr* **FOR PORT** *port*

**Explanation:** The Multi-site Workload Lifeline Advisor or Agent application was unable to initialize a listening socket.

In the message text:

*syscall*

The type of call that failed. For example, the system call might be a SOCKET, SETSOCKOPT, or BIND call.

*errno*

The UNIX System Services return code. See *return codes (errno)* in *z/OS UNIX System Services Messages and Codes* for more information about these return codes.

*errnojr*

The hexadecimal UNIX System Services reason code. See *return codes (errno)* in *z/OS UNIX System Services Messages and Codes* for more information about the format of the 4-byte reason code.

*port*

The port number on which the call failed.

**System action:** Processing ends.

**Operator response:** Determine whether TCP/IP is available and restart if necessary. Restart the application. If TCP/IP is available when the application issues this message, dump and save the internal log messages (If the AQSTRACE DD card was specified in the Advisor or Agent started procedure) or save the syslogd file and contact the system programmer.

**System programmer response:** If TCP/IP is available when the application issues this message and if syslogd was started, examine the syslogd file and correct the error. The syslogd identifier is lladvsr for the Advisor and llagent for the Agent. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and examine the internal log messages and correct the error.

**Module:** LMLISTEN

**Routing code:** 8, 10

## AQS0110I • AQS0111I

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0109I BIND CALL FAILED 6F/744C7246 FOR PORT 3860

---

### AQS0110I UNABLE TO ESTABLISH *endpoint* LISTENING SOCKET

**Explanation:** The Multi-site Workload Lifeline Advisor was unable to initialize because it could not create a listening socket.

In the message text:

*endpoint*

The listening socket that could not be created. Possible values are LOAD BALANCER, ADVISOR, or AGENT.

**System action:** Processing ends.

**Operator response:** Determine whether TCP/IP is available and restart if necessary. Restart the application. If TCP/IP is available when the application issues this message, dump and save the internal log messages (if the AQSTRACE DD card was specified in the Advisor or Agent started procedure) or save the syslogd file and contact the system programmer.

**System programmer response:** If TCP/IP is available when the Advisor issues this message, see message AQS0109I that might precede this message, or if syslogd was started, examine the syslogd file and correct the error. The syslogd identifier is lladvr for the Advisor. Otherwise, if the AQSTRACE DD card was specified in the Advisor started procedure, dump and examine the internal log messages and correct the error.

**Module:** LMLISTEN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0110I UNABLE TO ESTABLISH LOAD BALANCER LISTENING SOCKET

---

### AQS0111I *applname* DEBUG LEVEL *level*

**Explanation:** This message is issued in response to a MODIFY *procname*,DISPLAY,DEBUG command.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

*level*

The current debug level in effect. Valid debug level values are:

**1** Errors are logged.

**2** Warnings are logged.

**4** Significant events are logged.

**8** Informational messages are logged.

**16** Debug data messages are logged. This level is for IBM service use only. If the *applname* value is LLADVSR, messages related to TCP/IP messages sent between the Advisor and load balancers, between the primary and secondary Advisors, and between the Advisor and Agent are logged.

- 32 Debug data messages are logged. This level is for IBM service use only. If the *applname* value is LLAGENT, messages related to data collection and manipulation that support weight calculations are logged.
- 64 Internal debug data is logged. This level is for IBM service use only.
- 128 Function entry and exit tracing are logged. This level is for IBM service use only.

Individual values can be added together. For example, if the debug level displayed is 7, all ERROR, WARNING, and EVENT messages are logged. If the AQSTRACE DD card was specified in the Advisor or Agent started procedure, these messages are logged in internal memory, and only messages at the ERROR, WARNING, and EVENT levels are logged to the syslogd file. If the AQSTRACE DD card was not specified, all messages are logged to the syslogd file.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LACMD, LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

```
AQS0111I LLADVSR DEBUG LEVEL 7
```

#### AQS0112I LOAD BALANCER SUMMARY

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DISPLAY,LB command. This message is followed by summary information about connected load balancers. See "MODIFY *advisor\_proc*,DISplay command: Display Lifeline Advisor information" on page 69 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

**Automation:** Not applicable for automation.

#### AQS0113I LOAD BALANCER DETAILS

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DISPLAY,LB,DETAIL command. This message is followed by detailed information about connected load balancers. See "MODIFY *advisor\_proc*,DISplay command: Display Lifeline Advisor information" on page 69 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

## AQS0114I • AQS0116I

**Automation:** Not applicable for automation.

---

### AQS0114I MEMBER SUMMARY

**Explanation:** The Multi-site Workload Lifeline Agent issues this message in response to a MODIFY *procname*,DISPLAY,MEMBERS command. This message is followed by summary information about members (applications being load balanced) that one or more load balancers registered with the Multi-site Workload Lifeline Advisor. See “MODIFY *agent\_proc*,DISplay command: Display Lifeline Agent information” on page 93 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LACMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

**Automation:** Not applicable for automation.

---

### AQS0115I MEMBER DETAILS

**Explanation:** The Multi-site Workload Lifeline Agent issues this message in response to a MODIFY *procname*,DISPLAY,MEMBERS,DETAIL command. This message is followed by detailed information about members (applications being load balanced) that one or more load balancers registered with the Multi-site Workload Lifeline Advisor. See “MODIFY *agent\_proc*,DISplay command: Display Lifeline Agent information” on page 93 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LACMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

**Automation:** Not applicable for automation.

---

### AQS0116I *applname* INITIALIZATION ERROR - REASON CODE *reason*

**Explanation:** The Multi-site Workload Lifeline application could not initialize because it detected an error.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

*reason*

The code for the error encountered. Possible values for the reason code are:

- 1 Another copy of the application is already active. Only one copy of the Advisor or Agent can be active on an MVS system.
- 2 The Advisor or Agent application cannot open the configuration file, or found an error in the configuration file. Message AQS0105I might precede this message.
- 3 An internal error was encountered in the application.

- 4 The Advisor or Agent application found an error in a start option parameter in the started procedure.
- 5 The user ID associated with the started task is not authorized, or the application was not started as a started procedure.
- 6 A required resource is not available. For example, the TCP/IP stack is not started, or a configured IP address is not defined or available on the TCP/IP stack.
- 7 The Advisor or Agent application was started on an unsupported z/OS release.

**System action:** Processing ends.

**Operator response:**

- If the *reason* value is 1, verify that the instance of the active application is the one that you want. If a previous instance of the application is stopped but has not ended, issue a CANCEL command to cancel the previous instance before you start the new instance.
- If the *reason* value is 6, start the TCP/IP stack if it is not already started.
- If the *reason* value is 7, verify that the application is being started on a supported z/OS release. Multi-site Workload Lifeline is supported on z/OS V1R12 and higher releases.
- If the stack is already started, and for all other reason values, dump and save the internal log messages (if the AQSTRACE DD card was specified in the Advisor or Agent started procedure) or save the syslogd file and contact the system programmer.

**System programmer response:** Ensure that there is sufficient information to debug this problem. Configure the application to use a debug level of 127. See “Debug levels” on page 35 for information about how to configure the debug level for the specified application. Take the appropriate action, based on the *reason* value:

- If the *reason* value is 2, examine the application's dumped internal log messages file or syslogd file for errors. Correct the configuration file as needed. See Chapter 3, “Configuring Multi-site Workload Lifeline,” on page 17 for information about configuring the Advisor and Agent.
- If the *reason* value is 3, contact the IBM software support center. The application's dumped internal log messages file or syslogd file is the minimum diagnostic data that must be provided. See “Diagnostic data” on page 36 for more information about collecting diagnostic data.
- If the *reason* value is 4, examine the application's dumped internal log messages file or syslogd file for errors. Correct the started procedure as needed.
- If the *reason* value is 5, examine the security product profiles that have been established for the Advisor and Agent. Ensure that the application is started from a started procedure and that the user ID in the started procedure is permitted to the appropriate profiles if they are defined. See “Authorizing the Lifeline Agents to use WLM services” on page 15 for more information about setting up the authorization profiles for the security product.
- If the *reason* value is 6 and the TCP/IP stack is already started, and if syslogd was started, examine the syslogd file for errors. The syslogd identifier is 11advr for the Advisor and 11agent for the Agent. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and examine the internal log messages for errors. Verify that the correct IP addresses are configured in the configuration file. Correct the configuration file as needed. See Chapter 3, “Configuring Multi-site Workload Lifeline,” on page 17 for more information about configuring the Advisor and Agent.

**Module:** LAMAIN, LMADV, LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0116I LLADVSR INITIALIZATION ERROR - REASON CODE 6

---

**AQS0117I** *applname* CONFIGURATION WARNINGS DETECTED

**Explanation:** The Multi-site Workload Lifeline application configuration file contains one or more statements that resulted in warning messages being logged. These warnings do not cause the application to end, but might indicate conditions that affect the normal operation of the application.

In the message text:



## AQS0118I • AQS0120I

### *applname*

The application name. Possible values are:

#### LLADVSR

For the Multi-site Workload Lifeline Advisor

#### LLAGENT

For the Multi-site Workload Lifeline Agent

**System action:** Processing continues.

**Operator response:** Dump and save the internal log messages (if the AQSTRACE DD card was specified in the Advisor or Agent started procedure) or save the syslogd file and contact the system programmer.

**System programmer response:** If syslogd was started, examine the syslogd file for the application configuration warning messages. The syslogd identifier is lladvr for the Advisor and llagent for the Agent. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and examine the internal log messages for the application configuration warning messages. Correct the configuration file definitions that generated the warning messages and either restart the application or, if the *applname* value is LLADVSR and the corrections are for modifiable configuration definitions, issue the MODIFY *procname*,REFRESH command. See Chapter 3, "Configuring Multi-site Workload Lifeline," on page 17 for more information about configuring the Advisor and Agent.

**Module:** LACONFIG, LMADV, LMCMD, LMCONFIG

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### **Example:**

```
AQS0117I LLADVSR CONFIGURATION WARNINGS DETECTED
```

---

## AQS0118I ALL APPLICATIONS ARE QUIESCED BY OPERATOR

**Explanation:** The Multi-site Workload Lifeline Agent issues this message in response to a request to quiesce or enable a subset of the target applications. A MODIFY *procname*,QUIESCE or MODIFY *procname*,ENABLE command was issued. A previous MODIFY *procname*,QUIESCE,SYSTEM command was issued to quiesce all applications for this Agent. The Agent enforces a hierarchy so that a previous SYSTEM action cannot be overridden by a TCPNAME or PORT request.

**System action:** The MODIFY command is rejected because all applications have been quiesced by the MODIFY *procname*,QUIESCE,SYSTEM command.

**Operator response:** Issue the MODIFY *procname*,DISPLAY,MEMBERS command to list the registered members and the status flags for each member. The operator quiesce flag (SYSQ) indicates that an MVS operator quiesced all members. If you do not want some of the members to be quiesced, issue the MODIFY *procname*,ENABLE,SYSTEM command to re-enable all members, and the MODIFY *procname*,QUIESCE,TCPNAME=*stackname* command or the MODIFY *procname*,QUIESCE,PORT=*portnum* command to quiesce a subset of the members. See Chapter 8, "Lifeline Agent commands," on page 93 for more information.

**System programmer response:** None.

**Module:** LACMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

---

## AQS0120I ALL APPLICATIONS FOR *stackname* ARE QUIESCED BY OPERATOR

**Explanation:** The Multi-site Workload Lifeline Agent issues this message in response to a request to quiesce or enable a specific target application. A MODIFY *procname*,QUIESCE or MODIFY *procname*,ENABLE command was issued. A previous MODIFY *procname*,QUIESCE,TCPNAME=*stackname* command was issued to quiesce all



applications for the TCP/IP stack. The Agent enforces a hierarchy so that a previous TCPNAME action cannot be overridden by a PORT request.

In the message text:

*stackname*

The name of the TCP/IP stack.

**System action:** The MODIFY command is rejected because all applications for this TCP/IP stack have been quiesced by the MODIFY *procname*,QUIESCE,TCPNAME=*stackname* command.

**Operator response:** Issue the MODIFY *procname*,DISPLAY,MEMBERS command to list the registered members and the status flags for each member. The operator quiesce flag (TCPQ) indicates that an MVS operator quiesced all members for the TCP/IP stack. If you do not want some of the members to be quiesced, issue the MODIFY *procname*,ENABLE,TCPNAME=*stackname* command to re-enable all members for this TCP/IP stack, and the MODIFY *procname*,QUIESCE,PORT=*portnum* command to quiesce a subset of the members. See Chapter 8, "Lifeline Agent commands," on page 93 for more information.

**System programmer response:** None.

**Module:** LACMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0120I ALL APPLICATIONS FOR TCPIP ARE QUIESCED BY OPERATOR

#### AQS0121I NETWORK ACCESS TO PEER ADVISOR ON *sysname* HAS RECOVERED

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it has reestablished network communication with its peer Advisor.

In the message text:

*sysname*

The MVS system name where the peer Advisor is active.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0121I NETWORK ACCESS TO PEER ADVISOR ON CNTL2 HAS RECOVERED

#### AQS0122I NO MEMBERS MATCH SELECTION CRITERIA

**Explanation:** The Multi-site Workload Lifeline Agent issues this message in response to a MODIFY *procname*,QUIESCE or a MODIFY *procname*,ENABLE command. The MODIFY command is rejected because no active registered target applications match the criteria specified in the MODIFY command.

This message is also issued in response to a MODIFY *procname*,QUIESCE,TCP=*stackname* or MODIFY *procname*,ENABLE,TCP=*stackname* command when the *stackname* value does not match a TCP/IP stack that is active on the Agent system.

**System action:** The MODIFY command is ignored. Processing continues.

**Operator response:** Issue the MODIFY *procname*,DISPLAY,MEMBERS command to list the registered members on

## AQS0123I • AQS0124I

the local MVS system and the status flags for each member. The operator quiesce flag (SYSQ, TCPQ, or APPQ) indicates that an MVS operator quiesced the member. The absence of this flag indicates that the member is enabled from an MVS operator perspective. If the flag value is not the value that you want, issue a MODIFY *procname*,QUIESCE or a MODIFY *procname*,ENABLE command to change the flag value. See Chapter 8, "Lifeline Agent commands," on page 93 for more information.

**System programmer response:** None.

**Module:** LACMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

---

### AQS0123I *cmd* COMMAND REJECTED

**Explanation:** The Multi-site Workload Lifeline Agent issues this message in response to a MODIFY *procname*,QUIESCE or a MODIFY *procname*,ENABLE command. The MODIFY command is rejected. A more specific error message precedes this message and explains the reason for the command rejection.

In the message text:

*cmd*

The command that was rejected. Possible values are:

- QUIESCE TCPNAME
- ENABLE TCPNAME
- QUIESCE APPLICATION
- ENABLE APPLICATION

**System action:** The MODIFY command is ignored. Processing continues.

**Operator response:** Look for a previous message that provides more specific information about why the MODIFY command was rejected. Issue the MODIFY *procname*,DISPLAY,MEMBERS command to list the registered members on the local MVS system and the status flags for each member. The operator quiesce flag (SYSQ, TCPQ, or APPQ) indicates that an MVS operator quiesced the member. The absence of this flag indicates that the member is enabled from an MVS operator perspective. If the flag value is not the value that you want, issue a MODIFY *procname*,QUIESCE or a MODIFY *procname*,ENABLE command to change the flag value. See Chapter 8, "Lifeline Agent commands," on page 93 for more information.

**System programmer response:** None.

**Module:** LACMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0123I QUIESCE APPLICATION COMMAND REJECTED

---

### AQS0124I NETWORK ACCESS TO PEER ADVISOR ON *sysname* NOT AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it can no longer communicate with its peer Advisor over the network. If the Lifeline Advisor that issues this message is the secondary Advisor, AQS0164W was issued before this message.

In the message text:

*sysname*

The MVS system name where the peer Advisor was last active.

**System action:** Processing continues.

**Operator response:** Contact the system programmer.

**System programmer response:** Verify the network connectivity between this Advisor and the peer Advisor. Ensure that the Advisor configuration files are identical between this Advisor and the peer Advisor. See *z/OS Communications Server: IP Diagnosis Guide* for more information about diagnosing connectivity problems.

**Module:** LMBCPII

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** This message is a possible candidate for automation if you want to automatically issue the MODIFY *procname*,TAKEOVER command to have this Advisor assume the role of primary Advisor.

**Example:**

AQS0124I NETWORK ACCESS TO PEER ADVISOR ON CNTL2 NOT AVAILABLE

#### AQS0125I BCPII ACCESS TO PEER ADVISOR ON *sysname* NOT AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it can no longer communicate with the image (LPAR) where the peer Advisor was active by using the z/OS Base Control Program Internal Interface (BCPii) service.

In the message text:

*sysname*

The MVS system name where the peer Advisor was last active.

**System action:** Processing continues.

**Operator response:** Contact the system programmer.

**System programmer response:** Verify that z/OS is operational on the peer Advisor's image. Verify the connectivity used by BCPii to communicate with the peer Advisor's image. See *z/OS MVS Programming: Callable Services for High-Level Languages* for information about diagnosing BCPii issues.

**Module:** LMBCPII

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0125I BCPII ACCESS TO PEER ADVISOR ON CNTL2 NOT AVAILABLE

#### AQS0126I BCPII ACCESS TO PEER ADVISOR ON *sysname* HAS RECOVERED

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it has reestablished communication with the image (LPAR) where the peer Advisor was active by using the z/OS Base Control Program Internal Interface (BCPii) service.

In the message text:

*sysname*

The MVS system name where the peer Advisor is active.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMBCPII

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

## AQS0127W • AQS0128I

AQS0126I BCPII ACCESS TO PEER ADVISOR ON CNTL2 HAS RECOVERED

---

### AQS0127W *applname* CONNECTION TO ADVISOR AT *ipaddress* CLOSED DUE TO PROTOCOL ERROR

**Explanation:** The Multi-site Workload Lifeline Advisor that was started as the secondary Advisor or Agent issues this message when it closes its connection to the primary Advisor because of an internal protocol error. This message will be deleted when the secondary Advisor or Agent successfully reconnects to the primary Advisor.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline secondary Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

*ipaddress*

The IP address of the primary Advisor.

**System action:** The secondary Advisor or Agent writes messages to internal memory (if the AQSTRACE DD card was specified in the Advisor or Agent started procedure) or the syslogd file and attempts to reconnect to the primary Advisor.

**Operator response:** Dump and save the internal log messages (if the AQSTRACE DD card was specified in the Advisor or Agent started procedure) or save the syslogd file, and packet trace if it is active. Contact the system programmer.

**System programmer response:** If the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and examine the internal log messages. Otherwise, examine the syslogd files for the Advisor and Agent. The syslogd identifier is lladvsr for the Advisor and llagent for the Agent. If the debug level includes messages at the message level, the file will show the data that each application sent or received. If the data that was sent by one application was the same data received by the corresponding application, contact IBM software support services. If the data that was sent was not the same data that was received, this might indicate that the network integrity has been compromised. If the packet trace is active, examine the trace for the data that was sent and received. If the packet trace is not active, try to recreate the problem with active packet trace. See *z/OS Communications Server: IP Diagnosis Guide* for information about the packet trace.

**Module:** LMAARP, LAMAIN

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** This message is a possible candidate for automation if you want to automatically create snapshots of the Advisor and Agent syslogd or internal log messages files for later problem determination.

**Example:**

AQS0127W LLADVSR CONNECTION TO ADVISOR AT 10.10.10.1 CLOSED DUE TO PROTOCOL ERROR

---

### AQS0128I *peername* CONNECTION FROM *ipaddress* CLOSED DUE TO INACTIVITY

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the Advisor closes its connection to the Multi-site Workload Lifeline Agent or peer Advisor application because this Advisor did not receive a message from the application within the expected time.

In the message text:

*peername*

The application name. Possible values are:

**ADVISOR**

For the Multi-site Workload Lifeline Advisor

**AGENT**

For the Multi-site Workload Lifeline Agent

*ipaddress*

The IP address of the peer Advisor or Agent

**System action:** The Advisor closes the connection with the application. The peer Advisor or Agent attempts to reconnect to the Advisor until it is successful or is stopped. If the situation is temporary, the peer Advisor or Agent will successfully reconnect to the Advisor.

**Operator response:** If the peer Advisor or Agent is not active, start it. If the error persists, contact the system programmer.

**System programmer response:** Network connectivity problems, routing problems, slow system performance on the peer Advisor or Agent system, and low MVS dispatching priority for the application might cause this problem. If the error persists, increase the value of the `advisor_timeout` or `updated_interval` statement in the Advisor configuration file and restart the Advisor. See Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 for more information about configuration statements. See *z/OS Communications Server: IP Diagnosis Guide* for information about diagnosing network connectivity problems.

**Module:** LMADV, LMAGNT

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0128I ADVISOR CONNECTION FROM 10.10.10.1 CLOSED DUE TO INACTIVITY

**AQS0129I** *applname* CONNECTED TO ADVISOR AT *ipaddress*

**Explanation:** The Multi-site Workload Lifeline secondary Advisor or Agent issues this message when it is connected to the Multi-site Workload Lifeline primary Advisor.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline secondary Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

*ipaddress*

The IP address of the primary Advisor

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LAADV, LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0129I LLADVSR CONNECTED TO ADVISOR AT 10.10.10.1

**AQS0130I** *applname* CONNECTION TO ADVISOR AT *ipaddress* IS NO LONGER ACTIVE

**Explanation:** The Multi-site Workload Lifeline Advisor or Agent issues this message when it has lost its connection to the peer Multi-site Workload Lifeline Advisor.

In the message text:

## AQS0131I • AQS0132I

### *applname*

The application name. Possible values are:

#### **LLADVSR**

For the Multi-site Workload Lifeline primary or secondary Advisor

#### **LLAGENT**

For the Multi-site Workload Lifeline Agent

### *ipaddress*

The IP address of the primary or secondary Advisor

**System action:** The Advisor or Agent attempts to reconnect to the other Advisor. If the situation is temporary, the Advisor or Agent will successfully reconnect to the other Advisor.

**Operator response:** If the other Advisor is not active, start it. If the Advisor is active, dump and save the internal log messages (if the AQSTRACE DD card was specified in the Advisor started procedure) or save the syslogd file and contact the system programmer.

**System programmer response:** If syslogd was started, examine the syslogd file for Advisor or Agent error or warning messages. The syslogd identifier is `lladvsr` for the Advisor and `llagent` for the Agent. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and examine the internal log messages for error or warning messages. Correct any errors and restart the application that is in error.

**Module:** LAMAIN, LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### **Example:**

```
AQS0130I LLADVSR CONNECTION TO ADVISOR AT 10.10.10.1 IS NO LONGER ACTIVE
```

---

### **AQS0131I** AGENT CONNECTED FROM *ipaddress*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it is connected to a Multi-site Workload Lifeline Agent.

In the message text:

### *ipaddress*

The IP address of the Agent.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMAGNT

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### **Example:**

```
AQS0131I AGENT CONNECTED FROM 10.10.10.1
```

---

### **AQS0132I** AGENT CONNECTION FROM *ipaddress* IS NO LONGER ACTIVE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it lost its connection to the Multi-site Workload Lifeline Agent. This message usually indicates that the Agent has been stopped.

In the message text:

### *ipaddress*

The IP address of the previously connected Agent.

**System action:** Processing continues. If the Agent is not stopped, the Agent attempts to reconnect to the Advisor. If the situation is temporary, the Agent will reconnect to the Advisor.

**Operator response:** Determine whether the Agent has ended. Restart the Agent if necessary. If the Agent cannot reconnect to the Advisor, dump and save the internal log messages (if the AQSTRACE DD card was specified in the Agent started procedure) or save the syslogd file and contact the system programmer.

**System programmer response:** No action is required if the Agent was intentionally stopped; otherwise, if syslogd was started, examine the syslogd file for Advisor or Agent errors, or warning messages. The syslogd identifier is 11advsr for the Advisor and 11agent for the Agent. Otherwise, if the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and examine the internal log messages for Advisor or Agent errors, or warning messages. Correct any errors and restart the application that is in error.

**Module:** LMAGNT

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0132I AGENT CONNECTION FROM 10.10.10.1 IS NO LONGER ACTIVE

#### AQS0133I LOAD BALANCER CONNECTED FROM *ipaddress*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it is connected to a load balancer.

In the message text:

*ipaddress*

The IP address of the load balancer.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMLB

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0133I LOAD BALANCER CONNECTED FROM 10.10.10.1

#### AQS0134I LOAD BALANCER CONNECTION FROM *ipaddress* IS NO LONGER ACTIVE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it lost its connection with a load balancer. This message usually indicates that the load balancer has been stopped or the load balancer was incorrectly configured.

In the message text:

*ipaddress*

The IP address of the previously connected load balancer.

**System action:** Processing continues. If the load balancer is still active, it might attempt to reconnect to the Advisor.

**Operator response:** Determine whether the load balancer is active. Restart the load balancer, if necessary. If the load balancer is active, contact the system programmer.

**System programmer response:** Check the load balancer and correct any configuration or connectivity problems. Restart the load balancer, if necessary. See *z/OS Communications Server: IP Diagnosis Guide* for information about diagnosing network connectivity problems.



## AQS0135W • AQS0136W

**Module:** LMLB

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

```
AQS0134I LOAD BALANCER CONNECTION FROM 10.10.10.1 IS NO LONGER ACTIVE
```

---

### AQS0135W ADVISOR CONNECTION FROM *ipaddress* CLOSED DUE TO PROTOCOL ERROR

**Explanation:** The Multi-site Workload Lifeline Advisor that was started as the primary Advisor issues this message when it closes its connection to the secondary Advisor because of an internal protocol error. This message will be deleted when the secondary Advisor successfully reconnects to the Advisor.

In the message text:

*ipaddress*

The IP address of the secondary Advisor.

**System action:** The primary Advisor writes messages to internal memory (if the AQSTRACE DD card was specified in the Advisor started procedure) or to the syslogd file, and attempts to accept a reconnect from the secondary Advisor.

**Operator response:** Dump and save the internal log messages (if the AQSTRACE DD card was specified in the Advisor started procedure) or save syslogd file, and packet trace if it is active. Contact the system programmer.

**System programmer response:** If the AQSTRACE DD card was specified in the Advisor started procedure, dump and examine the internal log messages. Otherwise, examine the syslogd files for the Advisor. The syslogd identifier is 11advr for the Advisor. If the debug level includes messages at the message level, the file will show the data that each application sent or received. If the data that was sent by one application was the same data received by the corresponding application, contact IBM software support services. If the data that was sent was not the same data that was received, this might indicate that the network integrity has been compromised. If the packet trace is active, examine the trace for the data that was sent and received. If the packet trace is not active, try to recreate the problem with active packet trace. See *z/OS Communications Server: IP Diagnosis Guide* for information about the packet trace.

**Module:** LMAARP

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** This message is a possible candidate for automation if you want to automatically create snapshots of the Advisor and peer Advisor syslogd or internal log messages files for later problem determination.

**Example:**

```
AQS0135W ADVISOR CONNECTION FROM 10.10.10.1 CLOSED DUE TO PROTOCOL ERROR
```

---

### AQS0136W AGENT CONNECTION FROM *ipaddress* CLOSED DUE TO PROTOCOL ERROR

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it closes its connection to the Multi-site Workload Lifeline Agent because of an internal protocol error. This message will be deleted when the Agent successfully reconnects to the Advisor.

In the message text:

*ipaddress*

The IP address of the previously connected Agent.

**System action:** The Advisor writes messages to internal memory (if the AQSTRACE DD card was specified in the Advisor started procedure) or to the syslogd file. If the Agent is still active, it attempts to reconnect to the Advisor until the Agent connects with the Advisor or the Agent is stopped. If the situation is temporary, the Agent will reconnect to the Advisor.

**Operator response:** Dump and save the internal log messages (if the AQSTRACE DD card was specified in the Advisor started procedure) or save the syslogd file, and packet trace if it is active. Contact the system programmer.



**System programmer response:** If the AQSTRACE DD card was specified in the Advisor started procedure, dump and examine the internal log messages. Otherwise, examine the syslogd files for the Advisor and Agent. The syslogd identifier is lladvsr for the Advisor and llagent for the Agent. If the debug level includes messages at the message level, the file will show the data that each application sent or received. If the data that was sent by one application was the same data received by the corresponding application, contact IBM software support services. If the data that was sent was not the same data that was received, this might indicate that the network integrity has been compromised. If the packet trace is active, examine the trace for the data that was sent and received. If the packet trace is not active, try to recreate the problem with active packet trace. See *z/OS Communications Server: IP Diagnosis Guide* for information about the packet trace.

**Module:** LCZAP, LMAGNT

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** This message is a possible candidate for automation if you want to automatically create snapshots of the Advisor and Agent syslogd or internal log messages files for later problem determination.

**Example:**

AQS0136W AGENT CONNECTION FROM 10.10.10.1 CLOSED DUE TO PROTOCOL ERROR

**AQS0137I** *applname* ENDED ABNORMALLY

**Explanation:** The Multi-site Workload Lifeline application ended in response to an unexpected error.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

**System action:** Processing ends.

**Operator response:** Save the CEEDUMP and snap output. If the AQSTRACE DD card was specified in the application's started procedure, dump and save the internal log messages; otherwise save the syslogd file. Contact the system programmer.

**System programmer response:** Contact IBM software support services.

**Module:** LCASSERT, LCERROR

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** This message is a possible candidate for automation if you want to automatically create a snapshot of the Advisor or Agent syslogd or internal log messages file for later problem determination.

**Example:**

AQS0137I LLADVSR ENDED ABNORMALLY

**AQS0138I** *applname* DEBUG LEVEL UPDATED

**Explanation:** The Multi-site Workload Lifeline application issues this message in response to a MODIFY *procname*,DEBUG,LEVEL= command.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

## AQS0139I • AQS0140I

### LLAGENT

For the Multi-site Workload Lifeline Agent

**System action:** The MODIFY command is accepted. Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LACMD, LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0138I LLADVSR DEBUG LEVEL UPDATED

---

### AQS0139I ALL MATCHING REGISTERED APPLICATIONS ARE *state*

**Explanation:** The Multi-site Workload Lifeline Agent issues this message in response to a MODIFY *procname*,ENABLE|QUIESCE,SYSTEM command.

In the message text:

*state*

The state of the registered applications on the system where the command was issued. Possible values are:

- ENABLED
- QUIESCED

**System action:** The MODIFY command is accepted. Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LACMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0139I ALL MATCHING REGISTERED APPLICATIONS ARE QUIESCED

---

### AQS0140I *subtotal* OF *total* MATCHING REGISTERED APPLICATIONS ARE *state* – DISTRIBUTED DVIPA MEMBERS ARE IGNORED

**Explanation:** The Multi-site Workload Lifeline Agent issues this message in response to a MODIFY *procname*,ENABLE|QUIESCE,PORT|TCPNAME command.

In the message text:

*subtotal*

The count of matching applications that can be quiesced or enabled by the Agent.

*total*

The number of matching applications. This count includes the applications that can be quiesced or enabled by the Agent, and the applications that can only be quiesced or enabled by the VARY TCP/IP,,SYSPLEX,QUIESCE|RESUME command.

*state*

The state of the registered applications on the system where the command was issued. Possible values are:

- ENABLED
- QUIESCED

**System action:** The MODIFY command is accepted. Processing continues.

**Operator response:** If the *subtotal* value does not equal the *total* value, the remaining matching applications can be quiesced or enabled by TCPIP using only the VARY TCPIP,,SYSPLEX,QUIESCE|RESUME command.

**System programmer response:** None.

**Module:** LACMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0140I 4 OF 5 MATCHING REGISTERED APPLICATIONS ARE QUIESCED – DISTRIBUTED DVIPA MEMBERS ARE IGNORED

#### AQS0141I ADVISOR SUMMARY

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DISPLAY,ADVISOR command. This message is followed by summary information about this Advisor. See “MODIFY *advisor\_proc*,DISplay command: Display Lifeline Advisor information” on page 69 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

**Automation:** Not applicable for automation.

#### AQS0142I ADVISOR DETAILS

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DISPLAY,ADVISOR,DETAIL command. This message is followed by detailed information about this Advisor. See “MODIFY *advisor\_proc*,DISplay command: Display Lifeline Advisor information” on page 69 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

**Automation:** Not applicable for automation.

#### AQS0143I ADVISOR CONFIGURATION

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DISPLAY,CONFIG command. This message is followed by the active configuration for this Advisor. See “MODIFY *advisor\_proc*,DISplay command: Display Lifeline Advisor information” on page 69 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

## AQS0144I • AQS0146I

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

**Automation:** Not applicable for automation.

---

### AQS0144I AGENT CONFIGURATION

**Explanation:** The Multi-site Workload Lifeline Agent issues this message in response to a MODIFY *procname*,DISPLAY,CONFIG command. This message is followed by the active configuration for this Agent. See "MODIFY *agent\_proc*,DISplay command: Display Lifeline Agent information" on page 93 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LACMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

**Automation:** Not applicable for automation.

---

### AQS0145I WORKLOAD SUMMARY

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DISPLAY,WORKLOAD command. This message is followed by summary information about the workloads defined to this Advisor. See "MODIFY *advisor\_proc*,DISplay command: Display Lifeline Advisor information" on page 69 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

**Automation:** Not applicable for automation.

---

### AQS0146I WORKLOAD DETAILS

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DISPLAY,WORKLOAD,DETAIL command. This message is followed by detailed information about the workloads defined to this Advisor. See "MODIFY *advisor\_proc*,DISplay command: Display Lifeline Advisor information" on page 69 for the explanation of the display output.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 5, 8, 9

**Automation:** Not applicable for automation.

---

**AQS0147I BCPII ACCESS TO SITE *sitename* NOT AVAILABLE**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it can no longer communicate with any of the images (LPARs) in the site specified by the *sitename* value by using the z/OS Base Control Program Internal Interface (BCPii) service.

In the message text:

*sitename*

The sysplex name of the site to which BCPii access is not available.

**System action:** Processing continues.

**Operator response:** Contact the system programmer.

**System programmer response:** Verify that z/OS is operational on at least one of the site's images. Verify the connectivity used by BCPii to communicate with each of the site's images. See *z/OS MVS Programming: Callable Services for High-Level Languages* for information about diagnosing BCPii issues.

**Module:** LMBCPII

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0147I BCPII ACCESS TO SITE SITE02 NOT AVAILABLE

---

**AQS0148I BCPII ACCESS TO SITE *sitename* HAS RECOVERED**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it detects that it has reestablished communication with at least one image (LPAR) in the site specified by the *sitename* value by using the z/OS Base Control Program Internal Interface (BCPii) service.

In the message text:

*sitename*

The sysplex name of the site to which BCPii access has recovered.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMBCPII

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0148I BCPII ACCESS TO SITE SITE02 HAS RECOVERED

---

**AQS0153I WORKLOAD *workloadname state* ON SITE *sitename***

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,ACTIVATE|DEACTIVATE|QUIESCE,WORKLOAD=*workloadname*,SITE=*sitename* command.

In the message text:

*workloadname*

The name of the workload specified on the MODIFY command.

*state*

The state of the workload. Possible values are:

- ACTIVATED

## AQS0155I

- DEACTIVATED
- QUIESCED

*sitename*

The sysplex name of the site.

### System action:

- When the *state* value is QUIESCED, the Advisor notifies load balancers that new connection requests to server applications for the workload specified by the *workloadname* value must not be routed to the site specified by the *sitename* value. Connection timeouts or resets might occur on the client applications that initiated the requests while the workload is in a quiesced state.
- When the *state* value is DEACTIVATED, any active connections to server applications on the site specified by the *sitename* value that are defined in the workload are reset.
- When the *state* value is ACTIVATED, the Advisor notifies load balancers that new connection request to server applications for the workload specified by the *workloadname* value must be routed to the site specified by the *sitename* value.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### Example:

AQS0153I WORKLOAD WORK01 ACTIVATED ON SITE SITE01

---

**AQS0155I** WORKLOAD *workloadname* *state*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,ACTIVATE|DEACTIVATE|QUIESCE,WORKLOAD=*workloadname* command.

In the message text:

*workloadname*

The name of the workload specified on the MODIFY command.

*state*

The state of the specified workload. Possible values are:

- ACTIVATED
- QUIESCED
- DEACTIVATED

### System action:

- When the *state* value is QUIESCED, the Advisor notifies load balancers that new connection requests to server applications for the workload specified by the *workloadname* value must not be routed to any site. Connection timeouts or resets might occur on the client applications that initiated the requests while the workload is in a quiesced state.
- When the *state* value is DEACTIVATED, any active connections to server applications that are defined in the workload are terminated.
- When the *state* value is ACTIVATED, the Advisor notifies load balancers that new connection request to server applications for the workload specified by the *workloadname* value must be routed to both sites.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0155I WORKLOAD WORK01 QUIESCED

**AQS0156I** WORKLOAD *workloadname* IS NOT DEFINED TO SITE *sitename*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,ACTIVATE command. The Advisor configuration file contains a cross\_sysplex\_list definition for the workload specified by the *workloadname* value, but there is no definition of this workload for the site specified by the *sitename* value.

In the message text:

*workloadname*

The name of the workload specified on the MODIFY command.

*sitename*

The name of the site specified on the MODIFY command.

**System action:** The MODIFY command is ignored. Processing continues.

**Operator response:** Dump and save the internal log messages (if the AQSTRACE DD card was specified in the Advisor started procedure) or save the syslogd file and contact the system programmer.

**System programmer response:** Dump and examine the internal log messages (if the AQSTRACE DD card was specified in the Advisor started procedure) or examine the syslogd file for the Advisor configuration warning messages that were generated while the cross\_sysplex\_list definitions were being processed. The syslogd identifier is 11advr for the Advisor. Correct the configuration file warnings and either restart the Advisor or issue the MODIFY *procname*,REFRESH command. See Chapter 3, "Configuring Multi-site Workload Lifeline," on page 17 for more information about configuring the Advisor.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0156I WORKLOAD WORK01 IS NOT DEFINED TO SITE SITE01

**AQS0157I** NETWORK ACCESS TO SITE *sitename* NOT AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it can no longer communicate over the network with any Multi-site Workload Lifeline Agents in the site specified by the *sitename* value.

In the message text:

*sitename*

The sysplex name of the site to which network access is not available.

**System action:** Processing continues. If the site specified by the *sitename* value represents the active site for some workloads, the Advisor continues to direct load balancers to route new connection requests to server applications for these workloads to this site.

**Operator response:** Contact the system programmer.

**System programmer response:** Verify network connectivity between the Advisor and the site specified by the *sitename* value. Verify that Agents are running on each LPAR in the site where a server application for the workloads resides. See *z/OS Communications Server: IP Diagnosis Guide* for information about diagnosing network connectivity problems.

**Module:** LMLB

**Routing code:** 8, 10

## AQS0158I • AQS0159I

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0157I NETWORK ACCESS TO SITE SITE01 NOT AVAILABLE

---

**AQS0158I** STANDBY SITE *sitename* HAS RECOVERED FOR WORKLOAD *workloadname*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Standby workload in the Advisor configuration file.
- Message AQS0159I was previously issued for the workload.
- At least one server application is available in the standby site specified by the *sitename* value for each of the load balancer groups defined in the workload specified by the *workloadname* value.

In the message text:

*sitename*

The sysplex name of the standby site.

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMLB

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0158I STANDBY SITE SITE02 HAS RECOVERED FOR WORKLOAD WORK01

---

**AQS0159I** STANDBY SITE *sitename* HAS UNAVAILABLE SERVERS FOR WORKLOAD *workloadname*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Standby workload in the Advisor configuration file.
- No server applications are available in the standby site specified by the *sitename* value for at least one load balancer group defined in the workload specified by the *workloadname* value.

In the message text:

*sitename*

The sysplex name of the standby site.

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

**System action:** The site is no longer a usable target for the workload specified by the *workloadname* value.

**Operator response:** Notify the system programmer.

**System programmer response:** Ensure that server applications for the workload are active on the standby site specified by the *sitename* value.

**Module:** LMLB

**Routing code:** 8, 10



**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0159I STANDBY SITE SITE02 HAS UNAVAILABLE SERVERS FOR WORKLOAD WORK01

---

**AQS0160I NETWORK ACCESS TO SITE *sitename* HAS RECOVERED**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it reestablishes a connection with at least one Multi-site Workload Lifeline Agent in the site specified by the *sitename* value.

In the message text:

*sitename*

The sysplex name of the site to which network access has recovered.

**System action:** Processing continues.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMAGNT, LMLB

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0160I NETWORK ACCESS TO SITE SITE01 HAS RECOVERED

---

**AQS0161I UNABLE TO CONNECT TO PEER ADVISOR AFTER *time* SECONDS**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it is started as the primary Advisor and it does not detect another Advisor acting as the primary. When a configured primary Advisor is started, it always verifies that there is no other primary Advisor active before becoming the primary Advisor.

In the message text:

*time*

The number of seconds the Advisor waited trying to connect to the peer Advisor.

**System action:** The Advisor assumes the role of primary Advisor.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0161I UNABLE TO CONNECT TO PEER ADVISOR AFTER 10 SECONDS

---

**AQS0162I MODIFY *cmd* COMMAND QUEUED - *reason***

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DEACTIVATE|QUIESCE|ACTIVATE command. Processing of the command is delayed until the specified reason has been resolved.

In the message text:

## AQS0162I

### *cmd*

The MODIFY command that was issued. Possible values are:

- ACTIVATE
- DEACTIVATE
- QUIESCE

### *reason*

The reason that the command was not immediately processed. Possible values are:

#### **NO FIRST-TIER LOAD BALANCER IS REGISTERED**

A MODIFY *procname*,ACTIVATE or QUIESCE command was issued, but no first-tier load balancer is currently connected and registered with the Advisor.

#### **DEACTIVATE COMMAND IN PROGRESS**

A MODIFY *procname*,ACTIVATE or MODIFY *procname*,QUIESCE command was issued, but a prior MODIFY DEACTIVATE command has not yet completed.

#### **UNKNOWN LATENCY STATE FOR WORKLOAD *workloadname***

A MODIFY *procname*,ACTIVATE command was issued for the workload, specified by the *workloadname* value, but the database replication latency for the workload is unknown.

#### **QUIESCE FOR WORKLOAD *workloadname* QUEUED**

A MODIFY *procname*,DEACTIVATE command was issued for the workload, specified by the *workloadname* value, but a prior MODIFY QUIESCE command has not been processed.

#### **QUIESCE FOR ALL MATCHING WORKLOADS QUEUED**

A MODIFY *procname*,DEACTIVATE command was issued for all Active/Standby or all Active/Query workloads, but a prior MODIFY QUIESCE command has not been processed.

**System action:** Processing continues.

A MODIFY QUIESCE or MODIFY ACTIVATE command is not processed until the following conditions are true:

- A first-tier load balancer registers.
- A prior MODIFY DEACTIVATE command completes.

A MODIFY ACTIVATE command for an Active/Query workload is not processed until the Advisor receives an event over its Network Management Interface. The event indicates that database replication latency for the workload specified by the *workloadname* value is no longer in an unknown state.

A MODIFY DEACTIVATE command is not processed until a queued QUIESCE command for the workload specified by the *workloadname* value completes.

**Operator response:** Take the appropriate action, based on the *reason* value:

#### **NO FIRST-TIER LOAD BALANCER IS REGISTERED**

Contact the system programmer.

#### **DEACTIVATE COMMAND IN PROGRESS**

The MODIFY command will be processed when the DEACTIVATE command completes.

#### **UNKNOWN LATENCY STATE FOR WORKLOAD *workloadname***

Contact the system programmer.

#### **QUIESCE FOR WORKLOAD *workloadname* QUEUED**

The MODIFY command will be processed when the QUIESCE command completes.

#### **QUIESCE FOR ALL MATCHING WORKLOADS QUEUED**

The MODIFY command will be processed when the QUIESCE command completes.

**System programmer response:** Take the appropriate action, based on the *reason* value:

#### **NO FIRST-TIER LOAD BALANCER IS REGISTERED**

Verify the network connectivity between the Advisor and the first-tier load balancer. Check the load balancer and correct any configuration or connectivity problems. If necessary, restart the load balancer. See *z/OS Communications Server: IP Diagnosis Guide* for more information about diagnosing network connectivity problems.

**UNKNOWN LATENCY STATE FOR WORKLOAD** *workloadname*

Determine why database replication latency is in an unknown state, and correct, if possible.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0162I MODIFY QUIESCE COMMAND QUEUED – DEACTIVATE COMMAND IN PROGRESS

**AQS0163W WAITING FOR FIRST-TIER LOAD BALANCER REGISTRATION**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when no first-tier load balancers are connected and registered to it. This message will be deleted after the first first-tier load balancer connects and registers with the Advisor.

**System action:** Processing continues.

**Operator response:** Contact the system programmer.

**System programmer response:** Verify network connectivity between the Advisor and first-tier load balancer. Check the load balancer and correct any configuration or connectivity problems. Restart the load balancer if necessary. See *z/OS Communications Server: IP Diagnosis Guide* for more information about diagnosing network connectivity problems.

**Module:** LMMAIN

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** Not applicable for automation.

**AQS0164W UNABLE TO CONNECT TO PEER ADVISOR AFTER** *time* **SECONDS**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it is started as the secondary Advisor and is unable to connect to another Advisor acting as the primary Advisor. The message is deleted when either the peer Advisor is contacted or this Advisor assumes the role of primary Advisor.

In the message text:

*time*

The number of seconds the Advisor waited to try to connect to the peer Advisor.

**System action:** If the Advisor `advisor_takeover_policy` configuration statement is configured as manual, the Advisor remains in the secondary role. If `advisor_takeover_policy` is configured as automatic, the Advisor assumes the role of primary Advisor.

**Operator response:** If `advisor_takeover_policy` is configured as manual, issue the `MODIFY procname,TAKEOVER` command to have this Advisor assume the role of primary Advisor; otherwise, contact the system programmer.

**System programmer response:** Ensure that the Advisor started procedure is configured correctly (started in primary or secondary role). Verify the network connectivity between this Advisor and the peer Advisor. Ensure that the Advisor configuration files are identical between this Advisor and the peer Advisor. See Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 for more information about configuration statements and parameters. See *z/OS Communications Server: IP Diagnosis Guide* for more information about diagnosing network connectivity problems.

**Module:** LMADV

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** This message is a possible candidate for automation if you want to automatically issue the `MODIFY procname,TAKEOVER` command to have this Advisor assume the role of primary Advisor.

## AQS0165I • AQS0167I

### Example:

AQS0164W UNABLE TO CONNECT TO PEER ADVISOR AFTER 10 SECONDS

---

### AQS0165I PEER ADVISOR CONNECTED FROM *ipaddress*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when a peer Advisor has established a connection with it.

In the message text:

*ipaddress*

The IP address of the peer Advisor.

**System action:** Processing continues if the peer Advisor is configured as the secondary Advisor. If the peer Advisor is configured as the primary Advisor, this Advisor will assume the role of secondary Advisor.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### Example:

AQS0165I PEER ADVISOR CONNECTED FROM 10.10.10.1

---

### AQS0166I ADVISOR IS NOW IN PRIMARY ROLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it assumes the role of primary Advisor. The Advisor assumes the role in one of the following situations:

- The Advisor procedure was configured to start the Advisor as the primary Advisor.
- Communication was lost with the peer Advisor that is acting as the primary Advisor and this Advisor was configured to automatically take over the role of primary Advisor.
- A MODIFY *procname*, TAKEOVER command was issued.

**System action:** The Advisor assumes the role of primary Advisor and is able to accept connections from load balancers and Multi-site Workload Agents.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** This message is a possible candidate for automation if you want to automatically determine when to use MODIFY commands that are valid only for the primary Advisor.

---

### AQS0167I CONNECTION FROM *ipaddress* REJECTED – *reason*

**Explanation:** The Multi-site Workload Lifeline primary Advisor issues this message when it receives a connection request from a peer Advisor or Agent and the request is not accepted.

In the message text:

*ipaddress*

The IP address of the peer Advisor or Agent.

*reason*

The reason the connection was rejected. Possible values are:

**UNAUTHORIZED ADVISOR**

One of the following conditions is true:

- The IP address of the peer Advisor is not included in the Advisor `advisor_id_list` configuration statement.
- The IP address used to connect to this Advisor does not match the IP address in the Advisor `lb_connection_v4` or `lb_connection_v6` configuration statement.
- The Advisor requires a secure connection with the peer Advisor by using an Application Transparent TLS policy.

**SECONDARY ADVISOR ALREADY REGISTERED**

This Advisor is already communicating with another peer Advisor; only one peer connection is allowed.

**SECONDARY ADVISOR AT UNSUPPORTED LEVEL**

The secondary Advisor is at an earlier version than the primary Advisor. The secondary Advisor must be at the same or later version.

**AGENT AT UNSUPPORTED LEVEL**

The Agent is at an earlier version than the primary Advisor no longer supports.

**System action:** The connection from the peer Advisor is reset.

**Operator response:** Contact the system programmer.

**System programmer response:** Take the appropriate action, based on the *reason* value:

**UNAUTHORIZED ADVISOR**

For a non-secure connection, ensure that the IP address specified by the *ipaddress* value is included in the Advisor `advisor_id_list` configuration statement. Ensure that the IP address being used by the peer Advisor to connect to this Advisor matches the IP address in the Advisor `lb_connect_v4` or `lb_connection_v6` configuration statement. See Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 for more information about configuration statements and parameters.

For a secure connection, verify that the Application Transparent TLS policy on both Advisors is correctly defined. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring Application Transparent TLS.

**SECONDARY ADVISOR ALREADY REGISTERED**

Ensure that the peer Advisor currently connected to this Advisor is the correct one. If not, stop this peer Advisor and start the correct peer Advisor.

**SECONDARY ADVISOR AT UNSUPPORTED LEVEL**

Upgrade the secondary Advisor to a version that is the same with or later than the primary Advisor. See “Migrating the Lifeline Advisor” on page 24 for more information.

**AGENT AT UNSUPPORTED LEVEL**

Upgrade the Agent to a version that is supported by the primary Advisor. See Migrating the Lifeline Agent for more information.

**Module:** LMADV, LMAGNT, LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0167I CONNECTION FROM 10.10.10.1 REJECTED – UNAUTHORIZED ADVISOR

---

**AQS0168I** CONNECTION FROM *ipaddress* REJECTED – *reason*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it receives a connection request from a load balancer or Agent and it is not accepted.

In the message text:

*ipaddress*

The IP address of the load balancer or Agent.

*reason*

The reason the connection was rejected. Possible values are:

**UNAUTHORIZED AGENT**

The IP address of the Agent is not included in the Advisor `agent_id_list` configuration statement, the IP address used to connect to this Advisor does not match the IP address in the Advisor `lb_connection_v4` or `lb_connection_v6` configuration statement, or the Advisor requires a secure connection with the Agent by using an Application Transparent TLS policy.

**UNAUTHORIZED LB**

The IP address of the load balancer is not included in the Advisor `lb_id_list` configuration statement or the Advisor requires a secure connection with the load balancer by using an Application Transparent TLS policy.

**UNAUTHORIZED SITE**

The sysplex name of the site where the Agent resides is not defined in the Advisor `cross_sysplex_list` configuration statement.

**INCORRECT LB REGISTRATION**

One of the following events occurred:

- A first-tier load balancer attempted to register a group with an IP address or port that is not included in the Advisor `cross_sysplex_list` configuration statement.
- A second-tier load balancer attempted to register before a first-tier load balancer has registered.
- A second-tier load balancer attempted to register a group name that does not match any group name registered by a first-tier load balancer.
- A load balancer attempted to register a group with no associated port.

**System action:** The connection from the load balancer or Agent is reset.

**Operator response:** Contact the system programmer.

**System programmer response:** Take the appropriate action, based on the *reason* values:

**UNAUTHORIZED AGENT**

Ensure that the value that *ipaddress* specifies is included in the Advisor `agent_id_list` configuration statement. Ensure that the IP address being used by the Agent to connect to this Advisor matches the IP address in the Advisor `lb_connection_v4` or `lb_connection_v6` configuration statement.

For a secure connection, verify that the Application Transparent TLS policy on both the Advisor and Agent is correctly defined. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring Application Transparent TLS.

**UNAUTHORIZED LB**

Ensure that the value that *ipaddress* specifies is included in the Advisor `lb_id_list` configuration statement.

For a secure connection, verify that the Application Transparent TLS policy on the Advisor and security configuration on the load balancer is correctly defined. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring Application Transparent TLS.

**UNAUTHORIZED SITE**

Ensure that the sysplex name where the Agent resides is included in the Advisor `cross_sysplex_list` configuration statement.

**INCORRECT LB REGISTRATION**

- Dump and examine the internal log messages (if the AQSTRACE DD card was specified in the Advisor or Agent started procedure) or examine the `syslogd` file to determine which group is being registered incorrectly, and modify the first-tier load balancer to remove the group or ensure that the group is included in the Advisor `cross_sysplex_list` configuration statement.
- Ensure that a first-tier load balancer is configured to connect to the Advisor.
- Dump and examine the internal log messages (if the AQSTRACE DD card was specified in the Advisor or Agent started procedure) or examine the `syslogd` file to determine which first-tier load balancer groups are registered, and modify the second-tier load balancer configuration to ensure that its groups match the registered first-tier load balancer groups.
- Dump and examine the internal log messages (if the AQSTRACE DD card was specified in the Advisor or Agent started procedure) or examine the `syslogd` file to determine which group is being registered without a port and modify the load balancer configuration to specify a port for that group.

See Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 for more information about configuration statements and parameters.

**Module:** LMAGNT, LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0168I CONNECTION FROM 10.10.10.1 REJECTED – UNAUTHORIZED AGENT

#### AQS0169I PRIMARY ADVISOR TAKEOVER SCHEDULED

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,TAKEOVER command.

**System action:** The Advisor attempts to communicate with the peer Advisor to ensure that this Advisor will be the only one to assume the role of primary Advisor. Message AQS0166I will be issued when the takeover has completed.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

#### AQS0170I MODIFY TAKEOVER COMMAND IGNORED – *reason*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,TAKEOVER command.

In the message text:

*reason*

The reason the MODIFY TAKEOVER was ignored. Possible values are:

##### ALREADY PRIMARY

The Advisor is already the primary Advisor.

##### ALREADY SCHEDULED

A previous MODIFY *procname*,TAKEOVER command was issued and has not yet completed.

**System action:** The MODIFY command is ignored.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0170I MODIFY TAKEOVER COMMAND IGNORED – ALREADY PRIMARY



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**AQS0172I TAKEOVER PROCESSING INCOMPLETE - UNRESPONSIVE PEER AT *ipaddress***

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,TAKEOVER command. The Advisor attempted to notify the peer Advisor that this Advisor will become the primary Advisor. The connection was lost before the notification completed.

In the message text:

*ipaddress*

The last known IP address of the peer Advisor.

**System action:** The Advisor assumes the role of primary Advisor, but the role of the peer Advisor is unknown. Message AQS0166I will be issued when the takeover has completed.

**Operator response:** Contact the system programmer.

**System programmer response:** Verify the network connectivity between this Advisor and the peer Advisor. If the peer Advisor is not active, restart it. If the peer Advisor is active, verify that it is running as the secondary Advisor. See *z/OS Communications Server: IP Diagnosis Guide* for more information about diagnosing network connectivity problems.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0172I TAKEOVER PROCESSING INCOMPLETE - UNRESPONSIVE PEER AT 10.10.10.1

---

**AQS0173I ADVISOR IS NOW IN SECONDARY ROLE**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it assumes the role of secondary Advisor. The Advisor assumes the role of secondary Advisor when one of the following has occurred; the Advisor procedure was configured to start the Advisor as the secondary Advisor or a MODIFY *procname*,TAKEOVER command was issued on the peer Advisor.

**System action:** The Advisor assumes the role of secondary Advisor and attempts to connect to the peer Advisor.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** This message is a possible candidate for automation if you want to automatically determine when to use MODIFY commands that are valid only for the secondary Advisor.

---

**AQS0174I TAKEOVER FAILED – ERROR ON PRIMARY ADVISOR AT *ipaddress***

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,TAKEOVER command. While attempting to communicate with the peer Advisor to ensure that this Advisor will be the only one to assume the role of primary Advisor, the peer Advisor did not relinquish its role as primary Advisor.

In the message text:

*ipaddress*

The IP address of the peer Advisor.

**System action:** This Advisor remains in the role of secondary Advisor and the peer Advisor is in an unknown role.

**Operator response:** Contact the system programmer.

**System programmer response:** Check for console messages. If syslogd was started, examine the syslogd file on the



peer Advisor's system. The syslogd identifier is `lladvr` for the Advisor. If the AQSTRACE DD card was specified in the Advisor started procedure, dump and examine the internal log messages on the peer Advisor's system. If the peer Advisor is not active, restart it in the role of primary Advisor. If the peer Advisor is active, verify that it is running as the primary Advisor.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** This message is a possible candidate for automation if you want to automatically stop the peer Advisor and restart this Advisor as the primary Advisor.

**Example:**

AQS0174I TAKEOVER FAILED – ERROR ON PRIMARY ADVISOR AT 10.10.10.1

#### AQS0175I TAKEOVER FAILED – ERROR ESTABLISHING LISTENING SOCKETS

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a `MODIFY procname,TAKEOVER` command. While attempting to become the primary Advisor, this Advisor was unable to establish listening sockets to allow for load balancers, Multi-site Workload Lifeline Agents, or a peer Advisor to connect to it.

**System action:** The Advisor remains in the role of secondary Advisor.

**Operator response:** Determine whether TCP/IP is available and restart if necessary. Reissue the `MODIFY procname,TAKEOVER` command. If TCP/IP is available when this message is issued, save the syslogd file. Otherwise, if the AQSTRACE DD card was specified in the Advisor started procedure, dump and save the internal log messages. Contact the system programmer.

**System programmer response:** If TCP/IP is available when the Advisor issues this message, dump and examine the internal log messages (if the AQSTRACE DD card was specified in the Advisor started procedure) or examine the syslogd file to determine which listening sockets cannot be established and correct the error. The syslogd identifier is `lladvr` for the Advisor.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** This message is a possible candidate for automation if you want to automatically start the peer Advisor as the primary Advisor.

#### AQS0176I *type* STATE NOT REPLICATED TO SECONDARY ADVISOR

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it cannot send updated state information to the secondary Advisor.

In the message text:

*type*

The type of state. Possible values are:

- WORKLOAD
- BCPII

**System action:** Processing continues.

- If the *type* value is WORKLOAD, the primary and secondary Advisors are no longer in sync. If the secondary Advisor were to take over primary Advisor responsibilities, the state of the workloads is unknown.
- If the *type* value is BCPII and the secondary Advisor were to take over primary Advisor responsibilities, the system images that reside within the sites are unknown, but will be rediscovered as Agents from these system images reconnect to the Advisor.

**Operator response:** Contact the system programmer.

**System programmer response:** Verify the network connectivity between this Advisor and the secondary Advisor. If

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the AQSTRACE DD card was specified in the Advisor started procedure, dump and examine the internal log messages to determine the cause of the communication failure. Otherwise, examine the syslogd file to determine the cause of the communication failure. The syslogd identifier is 11advsr for the Advisor. Restart the secondary Advisor to enable the two Advisors to resync. See *z/OS Communications Server: IP Diagnosis Guide* for information about diagnosing network connectivity problems.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0176I WORKLOAD STATE NOT REPLICATED TO SECONDARY ADVISOR

---

### AQS0177I ADVISOR STOPPING – *reason*

**Explanation:** The Multi-site Workload Lifeline secondary Advisor issues this message during initialization when the peer Advisor resets the connection with this Advisor.

In the message text:

*reason*

The reason the secondary Advisor is stopping. Possible values are:

**NOT AUTHORIZED TO PRIMARY ADVISOR**

One of the following conditions is true:

- The IP address of this Advisor is not included in the peer Advisor `advisor_id_list` configuration statement.
- The IP address specified in the Advisor `lb_connection_v4` or `lb_connection_v6` configuration statement does not match what is defined in the peer Advisor's configuration.
- The peer Advisor requires a secure connection with this Advisor by using an Application Transparent TLS policy.

**PRIMARY ADVISOR ALREADY HAS A SECONDARY REGISTERED**

The peer Advisor is already communicating with another peer Advisor; only one peer connection is allowed.

**UNSUPPORTED LEVEL**

The secondary Advisor is at an earlier version than the peer Advisor. The secondary Advisor must be at the same or a later version.

**System action:** Processing ends. The connection with the peer Advisor is reset.

**Operator response:** Contact the system programmer.

**System programmer response:** Take the appropriate action, based on the *reason* value:

**NOT AUTHORIZED TO PRIMARY ADVISOR**

For a non-secure connection, ensure that the Advisor's IP address is included in the peer Advisor's `advisor_id_list` configuration statement. Ensure that the Advisor's `lb_connection_v4` and `connection_v6` configuration statements match the peer Advisor's configuration statements. See Chapter 6, "Multi-site Workload Lifeline configuration statements," on page 47 for more information about configuration statements and parameters.

For a secure connection, verify that the Application Transparent TLS policy on both Advisors is correctly defined. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring Application Transparent TLS.

**PRIMARY ADVISOR ALREADY HAS A SECONDARY REGISTERED**

Ensure that the secondary Advisor connected to the peer Advisor is the correct one. If not, stop the current secondary Advisor and restart this Advisor as the secondary Advisor.

**UNSUPPORTED LEVEL**

Upgrade the secondary Advisor to a version that is the same with or later than the peer Advisor. See "Migrating the Lifeline Advisor" on page 24 for more information.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0177I ADVISOR STOPPING – NOT AUTHORIZED TO PRIMARY ADVISOR

**AQS0178I WORKLOAD *workloadname* MUST BE QUIESCED BEFORE ISSUING A *cmd* COMMAND**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DEACTIVATE|ACTIVATE command. The workload must be quiesced before you can deactivate it or reroute it to an alternate standby site.

In the message text:

*cmd*

The MODIFY command that was issued. Possible values are:

- ACTIVATE
- DEACTIVATE

*workloadname*

The name of the workload specified on the MODIFY command.

**System action:** The MODIFY command is ignored.

**Operator response:** Issue a MODIFY *procname*,QUIESCE,WORKLOAD=*workloadname* to quiesce the workload, and reissue the MODIFY *procname*,DEACTIVATE|ACTIVATE command.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0178I WORKLOAD WORK01 MUST BE QUIESCED BEFORE ISSUING A DEACTIVATE COMMAND

**AQS0179I MODIFY *cmd* COMMAND IGNORED – *reason***

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when a MODIFY *procname* command is ignored.

In the message text:

*cmd*

The MODIFY command that was issued.

*reason*

The reason that the MODIFY command was ignored. Possible values are:

**NO GROUP IS REGISTERED FOR WORKLOAD**

The MODIFY *procname*,DEACTIVATE command was issued, but the load balancer which registered the group by using that workload is not currently registered.

**ADVISOR MUST BE PRIMARY**

The MODIFY command specified by the *cmd* value was issued on the Advisor that was acting as the secondary Advisor.

**NO AGENT IS REGISTERED**

The MODIFY *procname*,DEACTIVATE command was issued, but no Multi-site Workload Lifeline Agents from either site are available to reset active connections on their systems.

## AQS0180W

### SITE HAS NO ACTIVE AGENTS

The MODIFY *procname*,ACTIVATE command was issued to reroute the workload to a specific site, but no Multi-site Workload Lifeline Agents are available in that site.

**System action:** The MODIFY command is ignored.

**Operator response:** Take the following actions based on the *reason* value:

### NO GROUP IS REGISTERED FOR WORKLOAD

Register the load balancer that contains the group for the workload, and reissue the MODIFY command specified by the *cmd* value.

### ADVISOR MUST BE PRIMARY

Reissue the MODIFY command specified by the *cmd* value on the system where the primary Advisor is running.

### NO AGENT IS REGISTERED

Contact the system programmer.

### SITE HAS NO ACTIVE AGENTS

Contact the system programmer.

**System programmer response:** Verify whether the Agents on the site are active and, if necessary, restart the Agents. Verify network connectivity between the Advisor and Agents. See *z/OS Communications Server: IP Diagnosis Guide* for information about diagnosing network connectivity problems.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

### Example:

```
AQS0179I MODIFY QUIESCE COMMAND IGNORED – ADVISOR MUST BE PRIMARY
```

---

## AQS0180W WORKLOAD *workloadname* HAS UNAVAILABLE SERVERS ON SITE *sitename*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Standby workload in the Advisor configuration file.
- No server application is available in the site specified by the *sitename* value for at least one load balancer group defined in the workload specified by the *workloadname* value. A server application is considered unavailable in any of the following conditions:
  - The server application is not active.
  - The server application is active but not fully operational.
  - The system on which the server application runs is resource constrained.

This message will be deleted when at least one server application in each application group becomes available or the workload is rerouted to the alternate standby site.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

*sitename*

The sysplex name of the active site where no servers are available for the workload.

**System action:** The site is no longer a usable target for the workload specified by the *workloadname* value. If the Advisor *workload\_switch\_policy* configuration statement is configured as automatic, the Advisor will automatically notify load balancers that new connection requests to server applications for the specified workload that are currently being routed to the site that is specified by the *sitename* value must be routed to the alternate standby site. If the *workload\_switch\_policy* configuration statement is configured as manual, the Advisor continues notifying load

balancers to route new connection requests to server applications for the workload specified by the *workloadname* value to the site specified by the *sitename* value.

**Operator response:** If the *workload\_switch\_policy* configuration statement is configured as manual, issue the *MODIFY procname,ACTIVATE* command for the workload specified by the *workloadname* value currently being routed to the site specified by the *sitename* value to notify the load balancers that new connection requests must be routed to the specified site. See Chapter 7, “Lifeline Advisor commands,” on page 69 for more information. Contact the system programmer.

**System programmer response:** Ensure that the server applications for the workload are available on the active site specified by the *sitename* value. Verify that each server application is active and is fully operational, and that the system where it resides has sufficient resources. See *z/OS Communications Server: IP Diagnosis Guide* for more information about verifying server application availability.

**Module:** LMLB

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** This message is a possible candidate for automation if you want to automatically issue the *MODIFY procname,ACTIVATE* command to have the workload routed to the alternate site.

**Example:**

```
AQS0180W WORKLOAD WORK01 HAS UNAVAILABLE SERVERS ON SITE SITE01
```

#### AQS0181I ADVISOR CONFIGURATION UPDATED

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a *MODIFY procname,REFRESH* command.

**System action:** The Advisor configuration is updated.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

#### AQS0182I ADVISOR CONFIGURATION NOT UPDATED

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a *MODIFY procname,REFRESH* command. The Advisor configuration file cannot be opened, or contains one or more errors.

**System action:** The *MODIFY* command is ignored.

**Operator response:** Contact the system programmer.

**System programmer response:** If the *AQSTRACE* DD card was specified in the Advisor started procedure, dump and examine the internal log messages for configuration error messages. Otherwise, examine the *syslogd* file for configuration error messages. The *syslogd* identifier is *11advsr* for the Advisor. Correct the configuration file errors and reissue the *MODIFY procname,REFRESH* command. See Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 for more information about configuration statements and parameters.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

---

**AQS0184W PRIMARY AND SECONDARY ADVISOR CONFIGURATION NOT IN SYNC**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in one of the following cases:

- The secondary Advisor is started using a different configuration file than the primary Advisor.
- A MODIFY *procname*,REFRESH command issued from the peer Advisor results in the active configuration for the two Advisors to no longer be the same.

This message will be deleted when the active configuration of both Advisors is back in synchronization.

**System action:** Processing continues.

**Operator response:** Ensure that the Advisor configuration file is updated to match the peer Advisor and issue the MODIFY *procname*,REFRESH command from this Advisor.

**System programmer response:** None.

**Module:** LMADV

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** Not applicable for automation.

---

**AQS0185I AGENT CONNECTION TO ADVISOR AT *ipaddress* REJECTED – *reason***

**Explanation:** The Multi-site Workload Lifeline Agent issues this message during initialization when the Multi-site Workload Lifeline Advisor resets the connection with this Agent.

In the message text:

*ipaddress*

The IP address of the Advisor.

*reason*

The reason the Agent connection was rejected. Possible values are:

**SITE NOT DEFINED TO ADVISOR**

The site where this Agent resides is not included in the Advisor *cross\_sysplex\_list* configuration statement.

**NOT AUTHORIZED TO ADVISOR**

One of the following conditions occurred:

- The IP address defined in the Agent *host\_connection* configuration statement is not included in the Advisor *agent\_id\_list* configuration statement.
- The IP address defined in the Agent *advisor\_id* or *advisor\_id\_list* configuration statement does not match the Advisor *lb\_connection\_v4* or *lb\_connection\_v6* configuration statement.
- The Advisor requires a secure connection with this Advisor by using an Application Transparent TLS policy.

**UNSUPPORTED LEVEL**

The version of the Agent is unknown or no longer supported by the Advisor.

**System action:** Processing ends. The connection with the primary Advisor is reset.

**Operator response:** Contact the system programmer.

**System programmer response:** Take the appropriate action, based on the *reason* value:

**SITE NOT DEFINED TO ADVISOR**

Ensure that the Agent's site is included in the Advisor's *cross\_sysplex\_list* configuration statement. See Chapter 6, "Multi-site Workload Lifeline configuration statements," on page 47 for more information about configuration statements and parameters.

**NOT AUTHORIZED TO ADVISOR**

Ensure that the Agent's IP address defined in the *host\_connection* configuration statement is included in the Advisor's *agent\_id\_list* configuration statement. Ensure that the Agent's IP address defined in the *advisor\_id* or *advisor\_id\_list* configuration statement matches the Advisor's *lb\_connection\_v4* or *lb\_connection\_v6*

configuration statement. See Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 for more information about configuration statements and parameters.

For a secure connection, verify that the Application Transparent TLS policy on both the Advisor and Agent is correctly defined. See *z/OS Communications Server: IP Configuration Guide* for more information about configuring Application Transparent TLS.

#### UNSUPPORTED LEVEL

Upgrade the Agent to a version supported by the Advisor. See “Migrating the Lifeline Agent” on page 25 for more information.

**Module:** LAADV, LAMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

#### Example:

```
AQS0185I AGENT CONNECTION TO ADVISOR AT 10.10.10.1 REJECTED – NOT AUTHORIZED TO ADVISOR
```

#### AQS0186I ADVISOR NMI INTERFACE IS NO LONGER AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the Network Management Interface (NMI) is stopped.

**System action:** Processing continues. The NMI connections with network management agents are reset.

**Operator response:** Contact the system programmer.

**System programmer response:** If the AQSTRACE DD card was specified in the Advisor started procedure, dump and examine the internal log messages for NMI error messages and correct the error. Otherwise, examine the syslogd file for NMI error messages and correct the error. The syslogd identifier is lladvr for the Advisor. Recycle the Advisor to restart the NMI.

**Module:** LMNMI

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

#### AQS0187I BCPII MONITORING IS NOT AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when it is unable to use the Base Control Program Internal Interface (BCPii) service.

**System action:** Processing continues.

**Operator response:** If the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and save the internal log messages or save the syslogd file and contact the system programmer.

**System programmer response:** Verify that the BCPii address space was successfully started. Ensure that the Lifeline Advisor is authorized to use BCPii services. If the AQSTRACE DD card was specified in the Advisor or Agent started procedure, dump and examine the internal log messages to determine the cause of the BCPii failure. Otherwise, examine the syslogd file to determine the cause of the BCPii failure. The syslogd identifier is lladvr for the Advisor. Correct the problem, and then stop and restart the Lifeline Advisor. See *z/OS MVS Programming: Callable Services for High-Level Languages* for information about diagnosing BCPii issues.

**Module:** LMBCPII

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.



**AQS0188W** SITE *sitename* IS NOT AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when both of the following conditions occurs:

- The Advisor can no longer communicate over the network with any Multi-site Workload Lifeline Agents in the specified site.
- The Advisor can no longer communicate with any of the images (LPARs) in the specified site by using the Base Control Program Internal Interface (BCPii) service.

This message will be deleted when at least one Agent from this site reconnects to the Advisor or communication is reestablished with at least one image from this site by using BCPii services.

In the message text:

*sitename*

The sysplex name of the unresponsive site.

**System action:** The site is no longer considered responsive and is no longer a usable target for any defined workloads. If the Advisor workload\_switch\_policy configuration statement is configured with a value of automatic, the Advisor will automatically direct load balancers that new connection requests to server applications for workloads currently being routed to the site specified by the *sitename* value should be routed to the alternate, standby site. If workload\_switch\_policy is configured with a value of manual, the Advisor continues to direct load balancers to route new connection requests to server applications for these workloads to the site specified by the *sitename* value.

**Operator response:** If workload\_switch\_policy is configured with a value of manual, issue the MODIFY *procname*,ACTIVATE command for each workload currently being routed to the site specified by the *sitename* value. This will direct the load balancers that new connection requests should be routed to the alternate, standby site. See Chapter 7, "Lifeline Advisor commands," on page 69 for more information.

**System programmer response:** Ensure that the site specified by the *sitename* value is available. If the site is available, verify network connectivity between the Advisor and the site. Verify that Agents are running on each LPAR in the site where a server application for the workloads resides. Verify the connectivity used by BCPii to communicate with each of the site's images. See *z/OS Communications Server: IP Diagnosis Guide* for information about diagnosing network connectivity problems. See *z/OS MVS Programming: Callable Services for High-Level Languages* for information about diagnosing BCPii issues.

**Module:** LMBCPII, LMLB

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** This message is a possible candidate for automation if you want to automatically issue the MODIFY *procname*,ACTIVATE command to have workloads routed to the alternate site.

**Example:**

AQS0188W SITE SITE01 IS NOT AVAILABLE

---

**AQS0189W** PEER ADVISOR IS NOT AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when both of the following conditions occurs:

- The Advisor can no longer communicate over the network with the peer Advisor.
- The Advisor can no longer communicate with the image (LPAR) where the peer Advisor was active by using the Base Control Program Internal Interface (BCPii) service.

This message will be deleted when the peer Advisor reconnects to this Advisor or communication is reestablished with the image where the peer Advisor was active by using BCPii services.

**System action:** Processing continues. The peer Advisor site is no longer considered responsive.

**Operator response:** If this Advisor is the secondary Advisor and advisor\_takeover\_policy is configured with a value of manual, issue the MODIFY *procname*,TAKEOVER command to make this Advisor assume the role of primary Advisor; otherwise, contact the system programmer.



**System programmer response:** Ensure that the peer Advisor is available. Check for prior AQS0124I and AQS0125I messages to determine the system name where the peer Advisor was active. If the peer Advisor is available, verify network connectivity between the Advisor and its peer Advisor. Verify the connectivity used by BCPii to communicate with each of the site's images. See *z/OS Communications Server: IP Diagnosis Guide* for information about diagnosing network connectivity problems. See *z/OS MVS Programming: Callable Services for High-Level Languages* for information about diagnosing BCPii issues.

**Module:** LMBCPII

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** This message is a possible candidate for automation if you want to automatically issue the MODIFY *procname*,TAKEOVER command to have this Advisor assume the role of primary Advisor.

#### AQS0190I MULTIPLE CONNECTION ATTEMPTS FROM *ipaddress* REJECTED

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when a load balancer repeatedly tries to connect. This usually indicates that the load balancer was configured incorrectly and that the Advisor does not permit any of the connection attempts.

In the message text:

*ipaddress*

The IP address of the load balancer.

**System action:** Processing continues. If the load balancer is still active, it might continue to attempt to reconnect to the Advisor.

**Operator response:** Locate the prior AQS0168I message that precedes this message and contact the system programmer. Message AQS0168I describes the reason that the load balancer connection was rejected.

**System programmer response:** See message AQS0168I for information about how to correct the problem.

**Module:** LMLB

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0190I MULTIPLE CONNECTION ATTEMPTS FROM 10.10.10.1 REJECTED

#### AQS0191I MODIFY ACTIVATE COMMAND IGNORED - WORKLOAD *workloadname* HAS CONNECTIONS ON SITE *sitename*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when a MODIFY *procname*,ACTIVATE command is issued but active connections for the workload exist on the alternate site specified by the *sitename* value. See the MODIFY command section for more information.

In the message text:

*workloadname*

The name of the workload specified on the MODIFY command.

*sitename*

The name of the site specified on the MODIFY command.

**System action:** The MODIFY command is ignored.

**Operator response:** Issue the MODIFY *procname*,DEACTIVATE,WORKLOAD=*workloadname* command to reset any remaining active connections. Then reissue the MODIFY *procname*,ACTIVATE command.

**System programmer response:** None

**Module:** LMCMD

**Routing code:** 8, 10

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**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0191I MODIFY ACTIVATE COMMAND IGNORED – WORKLOAD WORK01 HAS CONNECTIONS ON SITE SITE01

---

### AQS0200I MODIFY *cmd* COMMAND NOT SUCCESSFUL - SITE *sitename* HAS NO ACTIVE AGENTS

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,ACTIVATE|DEACTIVATE command for an Active/Query workload. The Multi-site Workload Lifeline Agents on the site specified by the *sitename* value are either not active or are not reachable because of network connectivity issues.

In the message text:

*cmd*

The MODIFY command that was issued. Possible values are:

- ACTIVATE
- DEACTIVATE

*sitename*

The sysplex name of the site where the workload is being deactivated or activated.

**System action:** The MODIFY command is ignored.

**Operator response:** If possible, restart all Agents on the site, specified by the *sitename* value, and reissue the MODIFY command. If a MODIFY DEACTIVATE command was issued, the workload can still be activated on the alternate site, but you should verify that any active workload connections on the site, specified by the *sitename* value, are reset before you attempt to issue a MODIFY ACTIVATE command to the alternate site. If reissuing the MODIFY command continues to be unsuccessful, contact the system programmer.

**System programmer response:** Verify whether the Agents on the site specified by the *sitename* value are active and, if necessary, restart the Agents. Verify network connectivity between the Advisor and Agents. See *z/OS Communications Server: IP Diagnosis Guide* for information about diagnosing network connectivity problems.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0200I MODIFY DEACTIVATE COMMAND NOT SUCCESSFUL - SITE SITE01 HAS NO ACTIVE AGENTS

---

### AQS0201I ALL MATCHING WORKLOADS *state* ON SITE *sitename*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,ACTIVATE,WORKLOAD=\*ALL\_AS\*,SITE=*sitename* or a MODIFY *procname*,QUIESCE|DEACTIVATE|ACTIVATE,WORKLOAD=\*ALL\_AQ\*,SITE=*sitename* command.

In the message text:

*state*

The state of the workloads. Possible values are:

- QUIESCED
- DEACTIVATED
- ACTIVATED

*sitename*

The sysplex name of the site.

**System action:**

- When the *state* value is QUIESCED, the Advisor notifies load balancers that new connection requests to server applications for the matching workloads must not be routed to the site specified by the *sitename* value. Connection timeouts or resets might occur on the client applications that initiated the requests while these workloads are in a quiesced state.
- When the *state* value is DEACTIVATED, any active connections to server applications that are defined for the matching workloads on the site specified by the *sitename* value are terminated.
- When the *state* value is ACTIVATED, the Advisor notifies load balancers that new connection requests to server applications for the matching workloads are to be routed to the site specified by the *sitename* value.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

```
AQS0201I ALL MATCHING WORKLOADS QUIESCED ON SITE SITE01
```

#### AQS0202I ALL MATCHING WORKLOADS *state*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,QUIESCE|DEACTIVATE,WORKLOAD=\*ALL\_AS\* or a MODIFY *procname*,QUIESCE|DEACTIVATE|ACTIVATE,WORKLOAD=\*ALL\_AQ\* command. This message is also issued when the Advisor is initially started and all types of workloads are automatically quiesced.

In the message text:

*state*

The state of the workloads. Possible values are:

- QUIESCED
- DEACTIVATED
- ACTIVATED

**System action:**

- When the *state* value is QUIESCED, the Advisor notifies load balancers that new connection requests to server applications for the matching workloads must not be routed to any site. Connection timeouts or resets might occur on the client applications that initiated the requests while these workloads are in a quiesced state.
- When the *state* value is DEACTIVATED, any active connections to server applications that are defined for the matching workloads are terminated.
- When the *state* value is ACTIVATED, the Advisor notifies load balancers that new connection requests to server applications for the matching workloads are to be routed to both sites.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

```
AQS0202I ALL MATCHING WORKLOADS QUIESCED
```

**AQS0203W LOAD BALANCER CONNECTION FROM *ipaddress* IS UNRESPONSIVE**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when a load balancer is configured to request Server Application State Protocol (SASP) weights but the Advisor has not received any SASP message from this load balancer for more than twice the interval that is configured on the `failure_detection_interval` Advisor configuration statement. The message will be deleted when the Advisor receives a new SASP message from the load balancer.

In the message text:

*ipaddress*

The IP address of the load balancer.

**System action:** Processing continues. If the load balancer is still active, it might attempt to send an SASP message.

**Operator response:** Determine whether the load balancer is active. Restart the load balancer, if necessary. Otherwise, contact the system programmer.

**System programmer response:** Check the load balancer and correct any configuration or connectivity problems. Restart the load balancer, if necessary. See *z/OS Communications Server: IP Diagnosis Guide* for information about diagnosing network connectivity problems.

**Module:** LMLB

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** Not applicable for automation.

**Example:**

AQS0203W LOAD BALANCER CONNECTION FROM 10.10.10.1 IS UNRESPONSIVE

---

**AQS0204I *applname* DUMP INTERNAL LOG COMMAND SUCCESSFUL**

**Explanation:** The Multi-site Workload Lifeline Advisor or Agent issues this message in response to a `MODIFY procname,DUMPLOG` command when the command completes successfully.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

**System action:** The internal log messages are dumped to the file specified by the `AQSTRACE` DD card in the Advisor or Agent started procedure.

**Operator response:** None.

**System programmer response:** None.

**Module:** LACMD, LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0204I LLADVSR DUMP INTERNAL LOG COMMAND SUCCESSFUL

---

---

**AQS0205I** *applname* DUMP INTERNAL LOG COMMAND NOT SUCCESSFUL

**Explanation:** The Multi-site Workload Lifeline Advisor or Agent issues this message in response to a MODIFY *procname*,DUMPLOG command when the command does not complete successfully.

In the message text:

*applname*

The application name. Possible values are:

**LLADVSR**

For the Multi-site Workload Lifeline Advisor

**LLAGENT**

For the Multi-site Workload Lifeline Agent

**System action:** The internal log messages are not successfully dumped.

**Operator response:** Contact the system programmer.

**System programmer response:** Examine the syslogd file for reason the internal log messages could not be successfully dumped. The syslogd identifier is lladvsr for the Advisor and llagent for the Agent. Verify there is sufficient space on the Unix System Services filesystem where the internal log messages are to be dumped. If necessary, a console dump of the application can be taken to capture the internal log messages.

**Module:** LACMD, LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0205I LLADVSR DUMP INTERNAL LOG COMMAND NOT SUCCESSFUL

---

**AQS0206I** *peername* AT *ipaddress* IS AT A level LEVEL - SOME FUNCTIONS MIGHT NOT BE AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the Multi-site Workload Lifeline Agent or peer Advisor that connects to this Advisor is not at the same communication protocol version. This occurs when one of the following conditions is true:

- The peer Advisor or Agent is not at the same version level as this Advisor.
- The peer Advisor or Agent is at the same version level, but not at the same service level.

In the message text:

*peername*

The application name. Possible values are:

**ADVISOR**

For the Multi-site Workload Lifeline Advisor

**AGENT**

For the Multi-site Workload Lifeline Agent

*ipaddress*

The IP address of the peer Advisor or Agent

*level*

The indication of how the communication level is different. Possible values are:

**LOWER**

The peer Advisor or Agent is at a lower version or service level

**HIGHER**

The peer Advisor or Agent is at a higher version or service level

**System action:** Processing continues. The communication protocol version used will be the lower of the protocol versions between the Advisor and the other application. Any functions that are configurable at the higher

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communication protocol version are not available because the negotiated protocol version is at a lower level.

**Operator response:** Contact the system programmer.

**System programmer response:** If the AQSTRACE DD card was specified in the Advisor started procedure, dump and examine the internal log messages. Otherwise examine the syslogd files for the Advisor. The syslogd identifier is `lladvr` for the Advisor. A WARNING message is logged which indicates the communication protocol version supported by the Advisor and the negotiated communication protocol version. The negotiated version will be the lower of the protocol versions supported by the Advisor and application. Ensure that all Advisors and Agents are at the same version and service level. See "Migrating IBM Multi-site Workload Lifeline" on page 24 for information on migrating to a newer version.

**Module:** LMAGNT, LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0206I AGENT AT 10.10.10.10 IS AT A LOWER LEVEL - SOME FUNCTIONS MIGHT NOT BE AVAILABLE

---

### AQS0300I SECURE CONNECTION REQUEST RECEIVED FROM USER *userid* AT *ipaddress*

**Explanation:** The Multi-site Workload Lifeline Advisor received a Transport Layer Security (TLS) secure connection request originating at the IP address specified by the *ipaddress* value. The request was sent by a load balancer, Multi-site Workload Lifeline peer Advisor, or Multi-site Workload Lifeline Agent.

In the message text:

*userid*

The user ID of the load balancer, peer Advisor, or Agent that requests access to the Advisor.

*ipaddress*

The IP address of the load balancer, peer Advisor, or Agent that sent the request.

**System action:** Processing continues. SAF authorization for access to the Advisor will be checked for the user ID specified by the *userid* value.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0300I SECURE CONNECTION REQUEST RECEIVED FROM USER IBMUSER AT 10.10.10.1

---

### AQS0301I *client* CONNECTION ATTEMPT FROM USER *userid* AT *ipaddress* FAILED - REASON CODE *reason*

**Explanation:** The Multi-site Workload Lifeline Advisor received a connection request originating at the IP address specified by the *ipaddress* value. The request was sent by a load balancer, Multi-site Workload Lifeline peer Advisor, or Multi-site Workload Lifeline Agent.

Application Transparent Transport Layer Security (AT-TLS) was enabled in the TCP/IP stack and no matching `lb_id_list` (for load balancer connections), `advisor_id_list` (for peer Advisor connections), or `agent_id_list` (for Agent connections) entry was configured in the Advisor profile. Authorization for the connection to the Advisor failed for this client.

In the message text:

*client*

The type of client that attempted to connect to the Advisor. Possible values are:

**ADVISOR**

The client is a peer Advisor.

**AGENT**

The client is an Agent.

**LB** The client is a load balancer.

*userid*

The user ID of the load balancer, peer Advisor, or Agent that is requesting access to the Advisor. If the user ID is not obtained from AT-TLS, the value is UNKNOWN.

*ipaddress*

The IP address of the load balancer, peer Advisor, or Agent.

*reason*

The code that explains the failure. Possible values are:

- 1 A usable AT-TLS policy does not exist for this connection. For example, the policy agent is not active, or the AT-TLS policy for this connection specifies the wrong port.
- 2 The AT-TLS policy that is defined for this connection does not enable AT-TLS. In the policy, the TTLSEnvironmentAction statement is not configured with TTLSEnabled set to On.
- 3 The AT-TLS policy that is defined for this connection does not define the Advisor as a controlling application by requiring client authentication with SAF checking. In the policy for the Advisor, the TTLSEnvironmentAction statement is not configured correctly. The HandshakeRole must be set to ServerWithClientAuth. The TTLSEnvironmentAdvancedParms parameter must be configured with ApplicationControlled set to On and ClientAuthType set to SAFCheck.
- 4 The AT-TLS handshake failed for this connection.
- 5 System authorization facility (SAF) authorization failed for this connection. The SERVAUTH class profile AQS.LLADVSR.LBACCESS.*sysname* (for a load balancer connection), AQS.LLADVSR.ADVISORACCESS.*sysname* (for a peer Advisor connection), or AQS.LLADVSR.AGENTACCESS.*sysname* (for an Agent connection) exists but the user is not authorized to use this profile.
- 6 The Advisor was unable to obtain storage for processing an AT-TLS connection request.
- 7 The Advisor call to the SIOCTLSCTL IOCTL failed unexpectedly.
- 8 System authorization facility (SAF) authorization failed for this connection. The SERVAUTH class profile AQS.LLADVSR.LBACCESS.*sysname* (for a load balancer connection), AQS.LLADVSR.ADVISORACCESS.*sysname* (for a peer Advisor connection), or AQS.LLADVSR.AGENTACCESS.*sysname* (for an Agent connection) is not protected by SAF.

**System action:** Processing continues. The Advisor does not allow connections from this client. The client that attempted to connect to the Advisor might continue to attempt to connect.

**Operator response:** If the client is an Agent or load balancer, ensure that IP address of the client is defined in the *lb\_id\_list*, or *agent\_id\_list* statement in the Advisor configuration file. If the client is a peer Advisor and you are not using AT-TLS for this connection, ensure that IP address of the client is defined in the *advisor\_id\_list*.

If you are using AT-TLS for this connection, take the appropriate action, based on the *reason* value:

- 1 Start the Policy Agent if it is not started. If the AT-TLS policy for the Advisor connections has changed, refresh the Policy Agent. If the problem is not corrected, dump and save the Advisor internal log messages (if the AQSTRACE DD card was specified in the Advisor started procedure) or save the Advisor syslogd file, the AT-TLS syslogd file, and the policy agent syslogd file, and then contact the system programmer.
- 6 If the storage problem cannot be corrected, dump and save the Advisor internal log messages (if the AQSTRACE DD card was specified in the Advisor started procedure) or save the Advisor syslogd file. If a dump was not created, take a dump of the Advisor address space, and then contact the system programmer.

For all other reasons, save the system console, dump and save the Advisor internal log messages (if the AQSTRACE DD card was specified in the Advisor started procedure) or save the Advisor syslogd file, the AT-TLS syslogd file, and the policy agent syslogd file, and then contact the system programmer.

**System programmer response:** Examine the Advisor internal log messages file or syslogd file for errors. The syslogd



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identifier is lladvsr for the Advisor. Correct the lb\_id\_list, advisor\_id\_list, or agent\_id\_list statements in the configuration file as needed. See Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 for information about configuring the Advisor and Agent.

If you are using AT-TLS for this connection, take the appropriate action, based on the *reason* value:

- 1 If the Policy Agent is active and has been refreshed since the last change to the AT-TLS policy, examine the system console or internal log messages file, the Advisor syslogd file, the AT-TLS syslogd file, and the policy agent syslogd file for errors. Correct the AT-TLS policy for this connection. See *z/OS Communications Server IP Configuration Reference* for more information about the Policy Agent and policy statements for AT-TLS. Refresh the Policy Agent after changing the policy.
- 2 Change the AT-TLS policy for this connection in the TTLSEnvironmentAction statement to TTLSEnabled On. See *z/OS Communications Server IP Configuration Reference* for more information about the Policy Agent and policy statements for AT-TLS. Refresh the Policy Agent after changing the policy.
- 3 Change the AT-TLS policy for this connection in the TTLSEnvironmentAction statement to ensure the following:
  - The HandshakeRole is set to ServerWithClientAuth.
  - The TTLSEnvironmentAdvancedParms parameter is configured with ApplicationControlled set to On and ClientAuthType set to SAFCheck.

See *z/OS Communications Server IP Configuration Reference* for more information about the Policy Agent and policy statements for AT-TLS. Refresh the Policy Agent after changing the policy.

- 4 Correct the TLS handshake parameters in the AT-TLS policy for this connection. For example, ensure the following:
  - The HandshakeTimeout value for the Advisor policy is sufficient.
  - The HandshakeRole value for the Advisor is ServerWithClientAuth or Server.
  - The HandshakeRole value for the Agent and load balancers is Client.

See *z/OS Communications Server IP Configuration Reference* for more information about the Policy Agent and policy statements for AT-TLS. Refresh the Policy Agent after changing the policy.

- 5 Ensure that the user ID specified by the *userid* value has at least read access to the correct SERVAUTH class profile:
  - AQS.LLADVSR.LBACCESS.*sysname* for a load balancer connection
  - AQS.LLADVSR.ADVISORACCESS.*sysname* for a peer Advisor connection
  - AQS.LLADVSR.AGENTACCESS.*sysname* for an Agent connection

For more information, see *z/OS Security Server RACF Command Language Reference*.

- 6 If the storage problem cannot be corrected, contact IBM software support services with all supporting documentation. The application syslogd file or internal log messages file is the minimum diagnostic data that should be provided.
- 7 Examine the system console, the Advisor syslogd file, the AT-TLS syslogd or internal log messages file, and the policy agent syslogd file for errors. Ensure that the certificate is correct. For more information, see *z/OS Security Server RACF Command Language Reference*. If the problem is not corrected, contact IBM software support services with all supporting documentation.
- 8 Define and permit the LBACCESS and AGENTACCESS profiles on each system where the Advisor can run. Ensure that the user ID specified by the *userid* value has at least read access to the correct SERVAUTH class profile:
  - AQS.LLADVSR.LBACCESS.*sysname* for a load balancer connection
  - AQS.LLADVSR.ADVISORACCESS.*sysname* for a peer Advisor connection
  - AQS.LLADVSR.AGENTACCESS.*sysname* for an Agent connection

For more information, see *z/OS Security Server RACF Command Language Reference*.

**Module:** LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12



**Automation:** Not applicable for automation.

**Example:**

AQS0301I AGENT CONNECTION ATTEMPT FROM USER UNKNOWN AT 10.10.10.1 FAILED - REASON CODE 1

**AQS0302I WORKLOAD *workloadname1* MUST BE ACTIVE BEFORE ACTIVATING WORKLOAD *workloadname2***

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,ACTIVATE,WORKLOAD=*workloadname2* command when *workloadname1* is not active. The Advisor configuration file contains a query\_workload\_list definition that associates the workload specified by the *workloadname2* value with the workload specified by the *workloadname1* value.

In the message text:

*workloadname1*

The name of the Active/Standby workload associated with the workload specified on the MODIFY command.

*workloadname2*

The name of the Active/Query workload specified on the MODIFY command.

**System action:** The MODIFY command is ignored.

**Operator response:** Issue a MODIFY *procname*,ACTIVATE,WORKLOAD=*workloadname1*,SITE= command to activate the associated workload. Reissue the previous MODIFY command to activate the workload name specified by the *workloadname2* value. See the MODIFY command section for more information.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0302I WORKLOAD WORK01 MUST BE ACTIVE BEFORE ACTIVATING WORKLOAD WORKLOAD2

**AQS0303I WORKLOAD *workloadname* MUST BE QUIESCED ON SITE *sitename* BEFORE ISSUING A DEACTIVATE COMMAND**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DEACTIVATE,WORKLOAD=*workloadname* command when the workload has not been quiesced on the site specified by the *sitename* value.

In the message text:

*workloadname*

The name of the workload specified on the MODIFY command.

*sitename*

The sysplex name of the site where the workload is active.

**System action:** The MODIFY command is ignored.

**Operator response:** Issue a MODIFY *procname*,QUIESCE,WORKLOAD=*workloadname*,SITE=*sitename* command to quiesce the workload specified by the *workloadname* value. Reissue the previous MODIFY command to deactivate the workload. See the MODIFY command section for more information.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

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AQS0303I WORKLOAD WORK01 MUST BE QUIESCED ON SITE SITE01 BEFORE ISSUING A DEACTIVATE COMMAND

---

### AQS0304I *cmd* COMMAND FOR WORKLOAD *workloadname* MUST NOT SPECIFY A SITE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DEACTIVATE|QUIESCE,WORKLOAD=*workloadname*,SITE= command for an Active/Standby workload. Workloads that are defined in the Advisor configuration file as Active/Standby workloads cannot be deactivated or quiesced specifying the SITE keyword. The SITE keyword is valid on this MODIFY command only for workloads that are defined in the Advisor Configuration file as Active/Query workloads.

In the message text:

*cmd*

The MODIFY command that was issued. Possible values are:

- DEACTIVATE
- QUIESCE

*workloadname*

The name of the workload specified on the MODIFY command.

**System action:** The MODIFY command is ignored.

**Operator response:** Reissue the MODIFY command without specifying the SITE keyword. See the MODIFY command section for more information.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0304I QUIESCE COMMAND FOR WORKLOAD WORK01 MUST NOT SPECIFY A SITE

---

### AQS0305I ACTIVATE COMMAND FOR WORKLOAD *workloadname* MUST SPECIFY A SITE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,ACTIVATE,WORKLOAD=*workloadname* command for an Active/Standby workload. The workload specified by the *workloadname* value is defined in the Advisor configuration file as an Active/Standby workload and cannot be activated without specifying the SITE keyword. Omitting the SITE keyword is valid on this MODIFY command only for workloads that are defined in the Advisor Configuration file as Active/Query workloads.

In the message text:

*workloadname*

The name of the workload specified on the MODIFY command.

**System action:** The command is ignored.

**Operator response:** Reissue the MODIFY command specifying the SITE keyword. See the MODIFY command section for more information.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0305I ACTIVATE COMMAND FOR WORKLOAD WORK01 MUST SPECIFY A SITE

---

**AQS0306I** ACTIVATE COMMAND FOR MATCHING WORKLOADS MUST SPECIFY A SITE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,ACTIVATE,WORKLOAD=\*ALL\_AS\* command. All workloads that are defined in the Advisor configuration file as Active/Standby workloads cannot be activated without specifying the SITE keyword. Omitting the SITE keyword is valid on this MODIFY command only for workloads that are defined in the Advisor Configuration file as Active/Query workloads.

**System action:** The command is ignored.

**Operator response:** Reissue the MODIFY command specifying the SITE keyword. See the MODIFY command section for more information.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

---

**AQS0307I** *cmd* COMMAND FOR MATCHING WORKLOADS MUST NOT SPECIFY A SITE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message in response to a MODIFY *procname*,DEACTIVATE|QUIESCE,WORKLOAD=\*ALL\_AS\*,SITE= command. All workloads that are defined in the Advisor configuration file as Active/Standby workloads cannot be deactivated or quiesced specifying the SITE keyword. The SITE keyword is valid on this MODIFY command only for workloads that are defined in the Advisor Configuration file as Active/Query workloads.

In the message text:

*cmd*

The MODIFY command that was issued. Possible values are:

- DEACTIVATE
- QUIESCE

**System action:** The MODIFY command is ignored.

**Operator response:** Reissue the MODIFY command without specifying the SITE keyword. See the MODIFY command section for more information.

**System programmer response:** None.

**Module:** LMCMD

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0307I QUIESCE COMMAND FOR MATCHING WORKLOADS MUST NOT SPECIFY A SITE

---

**AQS0308W** WORKLOAD *workloadname* ACCESSING STALE DATA ON SITE *sitename*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Query workload in the Advisor configuration file.
- Static routing is configured for the workload, and the workload\_switch\_policy Advisor configuration statement is defined as manual.
- The Advisor receives an event over its Network Management Interface which indicates that database replication latency for the workload is in the acute or unknown state.

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The message will be deleted when the database replication for the workload is no longer in the acute or unknown state or the workload is quiesced on the site specified by the *sitename* value.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

*sitename*

The sysplex name of the site where the database is not current.

**System action:** Processing continues.

**Operator response:** Contact the system programmer.

**System programmer response:** Determine why database replication is in the acute or unknown state, and correct, if possible. If the workload specified by the *workloadname* value is active on the alternate site, quiesce the workload on the site specified by the *sitename* value, using the MODIFY *procname*,QUIESCE,WORKLOAD=*workloadname*,SITE= command, to ensure that the workload is routed only to the site where the database is current.

**Module:** LMADV

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** This message is a possible candidate for automation if you want to automatically issue the MODIFY *procname*,QUIESCE command to quiesce routing to the site where the database is not current.

**Example:**

```
AQS0308W WORKLOAD WORK01 ACCESSING STALE DATA ON SITE SITE01
```

---

**AQS0309I** WORKLOAD *workloadname* DATA ACCESS ON SITE *sitename* NOT AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Query workload in the Advisor configuration file.
- Dynamic routing is configured for the workload or static routing is configured for the workload and the workload\_switch\_policy Advisor configuration statement is defined as automatic.
- The Advisor receives an event over its Network Management Interface which indicates that database replication latency for the workload is in the acute or unknown state.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

*sitename*

The sysplex name of the site where the database is not current.

**System action:** The Advisor notifies load balancers to route connection requests to the alternate site.

**Operator response:** Contact the system programmer.

**System programmer response:** Determine why database replication is in the acute or unknown state, and correct, if possible.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

```
AQS0309I WORKLOAD WORK01 DATA ACCESS ON SITE SITE01 NOT AVAILABLE
```

---

**AQS0310I WORKLOAD *workloadname* DATA ACCESS ON SITE *sitename* HAS RECOVERED**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Query workload in the Advisor configuration file.
- Dynamic routing is configured for the workload or static routing is configured for the workload and the *workload\_switch\_policy* Advisor configuration statement is defined as automatic.
- Message AQS0309I was previously issued for the workload.
- The Advisor receives an event over its Network Management Interface which indicates that database replication latency for the workload is no longer in the acute or unknown state.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

*sitename*

The sysplex name of the site where the database is now current.

**System action:** The Advisor notifies load balancers to route new connection requests to both sites.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMLB

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0310I WORKLOAD WORK01 DATA ACCESS ON SITE SITE01 HAS RECOVERED

---

**AQS0311W PERSISTENT CONNECTION FUNCTION IS DISABLED – BACK LEVEL AGENT FOUND**

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the timeout parameter was enabled on the *query\_workload\_list* Advisor configuration statement, and a Lifeline Agent from an earlier release of Multi-site Workload Lifeline connects to the Advisor. See Chapter 6, “Multi-site Workload Lifeline configuration statements,” on page 47 for more information about configuration statements and parameters. The message will be deleted when the Agent, that is not at the current release, is stopped and the connection is closed with the Advisor.

**System action:** The persistent connection function is disabled.

**Operator response:** Contact the system programmer.

**System programmer response:** Dump and examine the internal log messages to determine which Agent is not at the current release. Otherwise, examine the Advisor *syslogd* file to determine which Agent is not at the current release. The *syslogd* identifier is *11advr* for the Advisor. Upgrade the Agent to the current release and restart it.

**Module:** LMAGNT, LMCMD

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** Not applicable for automation.

---

**AQS0312W ROUTING CONFIGURATION FOR WORKLOAD *workloadname* IGNORED – NOT ACTIVE ON SITE *sitename***

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is configured as an Active/Query workload in the Advisor configuration file.

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- Static routing is configured for the workload, and the workload\_switch\_policy Advisor configuration statement is defined as manual.
- The workload is activated to only a single site.

The message will be deleted when the workload is activated to the alternate site or the workload is quiesced.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

*sitename*

The sysplex name of the site where the workload is not activated.

**System action:** The Advisor notifies load balancers to route new connection requests for the workload only to the alternate site.

**Operator response:** Issue the MODIFY *procname*, ACTIVATE,WORKLOAD=*workloadname*,SITE=*sitename* command to ensure the workload is activated to both sites.

**System programmer response:** None.

**Module:** LMADV

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** Not applicable for automation.

**Example:**

AQS0312W ROUTING CONFIGURATION FOR WORKLOAD WORK01 IGNORED – NOT ACTIVE ON SITE SITE01

---

**AQS0313I** ROUTING CONFIGURATION FOR WORKLOAD *workloadname* IGNORED – NOT ACTIVE ON SITE *sitename*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is configured as an Active/Query workload in the Advisor configuration file.
- Static routing is configured for the workload, and the workload\_switch\_policy Advisor configuration statement is defined as automatic.
- The workload is activated to only a single site.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

*sitename*

The sysplex name of the site where the workload is not activated.

**System action:** The Advisor notifies load balancers to route new connections for the workload only to the alternate site.

**Operator response:** Issue the MODIFY *procname*, ACTIVATE,WORKLOAD=*workloadname*,SITE=*sitename* command to ensure the workload is activated to both sites.

**System programmer response:** None.

**Module:** LMADV

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0313I ROUTING CONFIGURATION FOR WORKLOAD WORK01 IGNORED – NOT ACTIVE ON SITE SITE01

---

**AQS0314I** ROUTING CONFIGURATION FOR WORKLOAD *workloadname* RESTORED

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is configured as an Active/Query workload in the Advisor configuration file.
- Static routing is configured for the workload, and the *workload\_switch\_policy* Advisor configuration statement is defined as automatic.
- Message AQS0313I was previously issued for the workload.
- The workload is now activated to both sites.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

**System action:** The Advisor notifies load balancers to route new connection requests for the workload to both sites.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMMAIN

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0314I ROUTING CONFIGURATION FOR WORKLOAD WORK01 RESTORED

---

**AQS0315W** WORKLOAD *workloadname* ATTEMPTING TO ACCESS UNAVAILABLE SERVERS ON SITE *sitename*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Query workload in the Advisor configuration file.
- Static routing is configured for the workload, and the *workload\_switch\_policy* Advisor configuration statement is defined as manual.
- The workload is active on the site specified by the *sitename* value.
- No servers are available on the site specified by the *sitename* value for the load balancer application group defined for the workload. A server application is considered unavailable if it is not active, it is active but not fully operational, or the system where it resides is resource constrained.

The message will be deleted when at least one server in the application group is active on the site or the workload is quiesced on the site specified by the *sitename* value.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

*sitename*

The sysplex name of the site where no servers are available for the workload.

**System action:** The Advisor continues notifying load balancers to route new connection requests for the workload to both sites.

**Operator response:** Contact the system programmer.

**System programmer response:** Ensure that the server applications for the workload are available on the site specified by the *sitename* value. Verify that each server application is active and is fully operational, and that the



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system where it resides has sufficient resources. If the workload specified by the *workloadname* value is active on the alternate site, quiesce the workload on the site specified by the *sitename* value, by using the MODIFY *procname*,QUIESCE,WORKLOAD=*workloadname*,SITE= command. This ensures the workload is routed only to the site where the server applications are active. See Chapter 7, "Lifeline Advisor commands," on page 69 for more information.

**Module:** LMLB

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** This message is a possible candidate for automation if you want to automatically issue the MODIFY *procname*,QUIESCE command to quiesce routing to the site where no servers for the workload are available.

**Example:**

```
AQS0315W WORKLOAD WORK01 ATTEMPTING TO ACCESS UNAVAILABLE SERVERS ON SITE SITE01
```

---

**AQS0316I** WORKLOAD *workloadname* HAS UNAVAILABLE SERVERS ON SITE *sitename*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Query workload in the Advisor configuration file.
- The workload is not active on the site specified by the *sitename* value, or dynamic routing is configured for the workload, or static routing is configured for the workload and the workload\_switch\_policy Advisor configuration statement is defined as automatic.
- No servers are available on the site specified by the *sitename* value for the load balancer application group defined for the workload. A server application is considered unavailable if it is not active, it is active but not fully operational, or the system where it resides is resource constrained.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

*sitename*

The sysplex name of the site where no servers are available for the workload.

**System action:** The Advisor notifies load balancers to route new connection requests for the workload only to the alternate site.

**Operator response:** Contact the system programmer.

**System programmer response:** Ensure that the server applications for the workload are available on the site specified by the *sitename* value. Verify that each server application is active and is fully operational, and that the system where it resides has sufficient resources.

**Module:** LMLB

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** Not applicable for automation.

**Example:**

```
AQS0316I WORKLOAD WORK01 HAS UNAVAILABLE SERVERS ON SITE SITE01
```

---

**AQS0317I** WORKLOAD *workloadname* HAS RECOVERED ON SITE *sitename*

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Query workload in the Advisor configuration file.
- Dynamic routing is configured for the workload or static routing is configured for the workload and the workload\_switch\_policy Advisor configuration statement is defined as automatic.



- Message AQS0316I was previously issued for the workload.
- At least one server application is available on the site specified by the *sitename* value for the load balancer application group defined for the workload.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

*sitename*

The sysplex name of the site where a server is now available.

**System action:** The Advisor notifies load balancers to route new connection requests for the workload to both sites.

**Operator response:** None.

**System programmer response:** None.

**Module:** LMLB

**Routing code:** 1, 8

**Descriptor code:** 2, 7

**Automation:** Not applicable for automation.

**Example:**

AQS0317I WORKLOAD WORK01 HAS RECOVERED ON SITE SITE01

#### AQS0318W WORKLOAD *workloadname* IS NOT AVAILABLE

**Explanation:** The Multi-site Workload Lifeline Advisor issues this message when the following conditions are true:

- The workload specified by the *workloadname* value is defined as an Active/Query workload in the Advisor configuration file.
- The workload is unavailable on both sites. A workload is unavailable on a site when one of the following conditions is true:
  - No servers are available on that site for a load balancer group defined for the workload. A server application is considered unavailable when one of the following conditions is true:
    - The server application is not active.
    - The server application is active but not fully operational.
    - The system where the server application resides is resource constrained.
  - The workload is not activated on the site.
  - The Advisor receives an event over its Network Management Interface which indicates that database replication latency for the workload is in the acute or unknown state on that site.

The message will be deleted when at least one server application in each load balancer group is active on one of the sites.

In the message text:

*workloadname*

The name of the workload that is defined in the Advisor configuration file.

**System action:** Processing continues.

**Operator response:** Contact the system programmer.

**System programmer response:** Issue F AQSADV,DISPLAY,WORKLOAD,DETAIL to determine whether the workload failure on a site is caused by server application unavailability, the workload not being activated on the site, or replication latency.

- If the server application is unavailable, verify that each server application is active and is fully operational, and that the system where it resides has sufficient resources.
- If the workload is not activated on the site, issue the MODIFY AQSADV,ACTIVATE,WORKLOAD= command to activate the workload on the site.

- If replication latency is causing the failure, determine why database replication is in the acute or unknown state, and, if possible, resolve the cause of the replication latency state.

**Module:** LMLB

**Routing code:** 8, 10

**Descriptor code:** 12

**Automation:** Not applicable for automation.

**Example:**

AQS0318W WORKLOAD WORK01 IS NOT AVAILABLE

---

## Appendix A. A sample started procedure for Lifeline Advisors

You can use the sample started procedure to understand how to set up the environment for the Lifeline Advisor.

```
//AQSADV PROC ROLE=S
//*
//*****
//* Function: Sample procedure for running the Multi-site
//* Workload Lifeline Advisor
//*
//* Parameters: [ROLE={S | P}]
//* S ==> Secondary Advisor (Default Role)
//* P ==> Primary Advisor
//*****
//AQSADV EXEC PGM=AQSLBADV,REGION=0K,TIME=NOLIMIT,
// PARM='/ -R &ROLE'
//*****
//* The STEPLIB card below points to the PDS/E where the Lifeline
//* load modules are kept.
//*****
//STEPLIB DD DSN=USER.LOADLIB,DISP=SHR
//*****
//* The CONFIG card below points to the member where the Lifeline
//* Advisor configuration file is located
//*****
//CONFIG DD DSN=USER.PROFILES(ADVCONF),DISP=SHR
//STDENV DD DUMMY
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=F,LRECL=80,BLKSIZE=80)
//SYSIN DD DUMMY
//SYSERR DD SYSOUT=*
//SYSOUT DD SYSOUT=*,DCB=(RECFM=F,LRECL=80,BLKSIZE=80)
//CEEDUMP DD SYSOUT=*,DCB=(RECFM=FB,LRECL=132,BLKSIZE=132)
//SYSDUMP DD SYSOUT=*,DCB=(RECFM=FB,LRECL=132,BLKSIZE=132)
//*****
//* The SYSTCPD card below points to the member where the TCPIP.DATA
//* file is located
//*****
//SYSTCPD DD DSN=USER.PROFILES(TCPDATA),DISP=SHR
//*****
//* The AQSTRACE card below points to the HFS file where the Advisor
//* records internal log messages.
//*****
//AQSTRACE DD PATH='/tmp/advisor.trace',PATHOPTS=(OWRONLY,OCREAT),
// PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIROTH)
```

Figure 6. Sample started procedure AQSADV



---

## Appendix B. A sample started procedure for Lifeline Agents

You can use the sample started procedure to understand how to set up the environment for the Lifeline Agent.

```
//AQSAGE PROC
//*
//*****
//*
//* Function: Sample procedure for running the Multi-site
//* Workload Lifeline Agent
//*
//*****
//AQSAGE EXEC PGM=AQSLBAGE,REGION=0K,TIME=NOLIMIT,
// PARM='POSIX(ON) ALL31(ON)/'
//*****
//* The STEPLIB card below points to the PDS/E where the Lifeline
//* load modules are kept.
//*****
//STEPLIB DD DSN=USER.LOADLIB,DISP=SHR
//*****
//* The CONFIG card below points to the member where the Lifeline
//* Agent configuration file is located
//*****
//CONFIG DD DSN=USER.PROFILES(AGECONF),DISP=SHR
//STDENV DD DUMMY
//SYSPRINT DD SYSOUT=*,DCB=(RECFM=F,LRECL=80,BLKSIZE=80)
//SYSIN DD DUMMY
//SYSERR DD SYSOUT=A
//SYSOUT DD SYSOUT=A
//CEEDUMP DD SYSOUT=A
//SYSDUMP DD SYSOUT=A
//*****
//* The SYSTCPD card below points to the member where the TCPIP.DATA
//* file is located
//*****
//SYSTCPD DD DSN=USER.PROFILES(TCPDATA),DISP=SHR
//*****
//* The AQSTRACE card below points to the HFS file where the Agent
//* records internal log messages.
//*****
//AQSTRACE DD PATH='/tmp/agent.trace',PATHOPTS=(OWRONLY,OCREAT),
// PATHMODE=(SIRUSR,SIWUSR,SIRGRP,SIROTH)
```

Figure 7. Sample started procedure AQSAGE



## Appendix C. Sample configuration statements

You can use the following examples to understand how to configure the Lifeline Advisor and the Lifeline Agent for different workload environments.

### Multi-site Workload Lifeline configuration Example 1

The following figure shows an example of the Multi-site Workload Lifeline configuration where an Active/Standby workload uses the z/OS sysplex distributor to route requests within a site. It also shows how to configure the Lifeline Advisors and Lifeline Agents to work in such an environment.

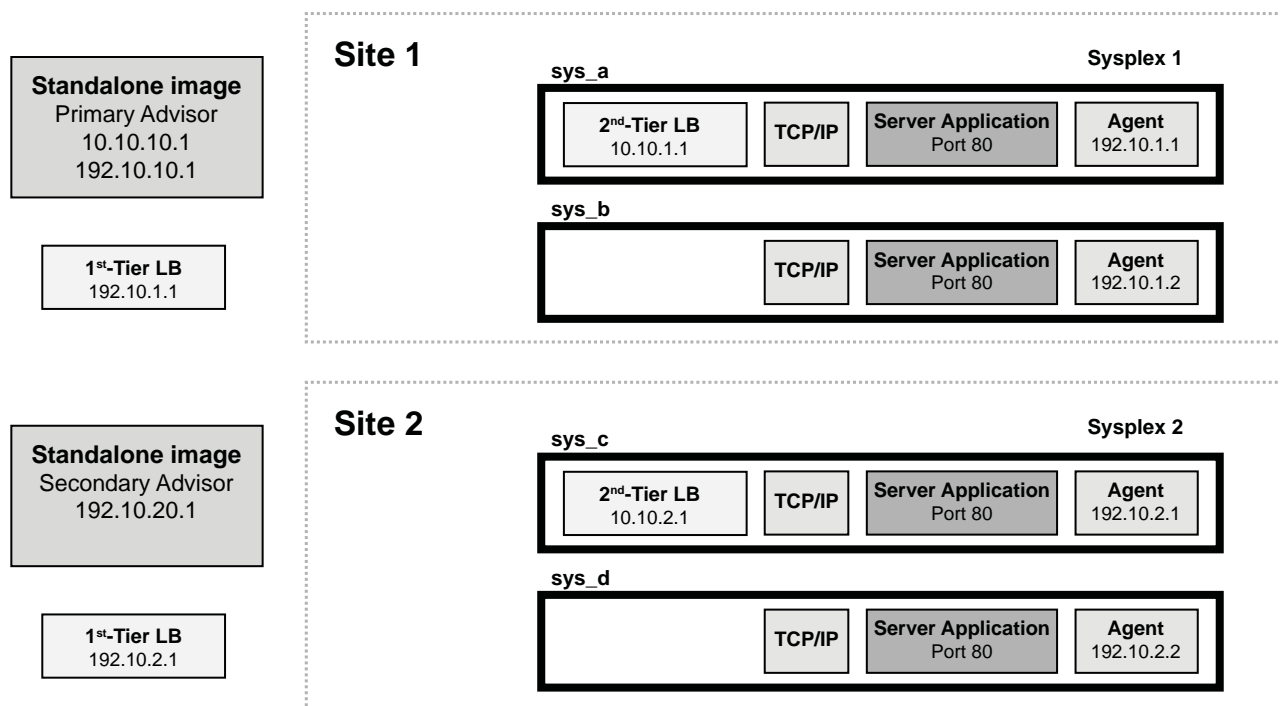


Figure 8. Multi-site Workload Lifeline configuration Example 1

To configure the previous sample environment shown in Figure 8, complete the following tasks:

1. Configure and start the Lifeline Advisor on the primary controller in the primary role. The primary Advisor listens on dynamic VIPA (DVIPA) address 10.10.10.1, which is defined in the VIPARANGE statement.
2. Configure and start the Lifeline Advisor on the secondary controller, in the secondary role. The secondary Advisor uses static VIPA address 192.10.20.1 to communicate with the primary Advisor.
3. Define distributable DVIPA 10.10.1.1 on system **sys\_a** in sysplex Site1, and allow both **sys\_a** and **sys\_b** to be targets of this DVIPA.
4. Define distributable DVIPA 10.10.2.1 on system **sys\_c** in sysplex Site2, and allow both **sys\_c** and **sys\_d** to be targets of this DVIPA.

5. Configure and start Lifeline Agents on each of the images in Site 1 and Site 2, using the static VIPA that is defined in that image (192.10.1.1 on sys\_a, 192.10.1.2 on sys\_b, 192.10.2.1 on sys\_c, and 192\_10.2.2 on sys\_d).

### **Sample configuration statements for the Lifeline Advisor**

You can use the following sample configuration file to configure the Lifeline Advisor for Example 1. Use this configuration file for the Advisors on both the primary and secondary controllers.



```

#####
#
This file contains sample configuration statements for the Lifeline
Advisor - using default settings in most cases.
#
#####

Following specifies the port which the primary advisor will listen
on for connections from agents.
agent_connection_port 8181

Following specifies which agents are allowed to connect to the
primary advisor.
agent_id_list
{
 192.10.1.1..4000 # IP address and port for sys_a
 192.10.1.2..4000 # IP address and port for sys_b
 192.10.2.1..4000 # IP address and port for sys_c
 192.10.2.2..4000 # IP address and port for sys_d
}

Following specifies the port which the primary advisor will listen
on for connections from a secondary advisor.
advisor_connection_port 8000

Following specifies which secondary advisors are allowed to connect
to the primary advisor (should contain at least the IP address of this
host).
advisor_id_list
{
 192.10.10.1 # IP address for Advisor on primary controller
 192.10.20.1 # IP address for Advisor on secondary controller
}

Following specifies the IPv4 address and port the primary advisor
listens on for connections from load balancers.
lb_connection_v4 10.10.10.1..3860

Following specifies which load balancers are allowed to connect to
the primary advisor.
lb_id_list
{
 192.10.1.1 # IP address of LB in Site1
 192.10.2.1 # IP address of LB in Site2
}

Following specifies the IP address and site name (i.e. sysplex name)
that identifies each z/OS sysplex distributor
used to route the workload, the port number of the server
application used for the workload, and the workload name.
These entries represent the load balancer server groups
registered by the first-tier load balancers.
cross_sysplex_list
{
 10.10.1.1..80,SITE1,WORKLOAD1 # HTTP Server on Site1
 10.10.2.1..80,SITE2,WORKLOAD1 # HTTP Server on Site2
}

```

*Figure 9. Sample configuration statements for the Lifeline Advisor*

The Lifeline Advisor accesses files within the UNIX System Services shell, so the Lifeline Advisor needs to have an OMVS segment defined for it. Assuming that the Lifeline Advisor is started using a procedure called AQSADV, use the following JCL snippet to define the OMVS segment:

```
//EZARACF JOB MSGLEVEL=(1,1),MSGCLASS=A,CLASS=A
//DAEMONS EXEC PGM=IKJEFT01
//SYSTSPRT DD SYSOUT=*
//SYSTSIN DD *
 ADDUSER AQSADV DFLTGRP(OMVSGRP) OMVS(UID(0) HOME('/'))
 RDEFINE STARTED AQSADV.* STDATA(USER(AQSADV))
 SETROPTS RACLIST(STARTED) REFRESH
/*
```

Based on this example, you need to update the TCPIP profile on the two stand-alone images to contain the following information:

```
VIPADYNAMIC
 VIPARANGE DEFINE 255.255.255.255 10.10.10.1
ENDVIPADYNAMIC
```

## Sample configuration statements for the Lifeline Agent

You can use the following sample configuration file to configure the Lifeline Agent for Example 1.

```
#####
#
This file contains sample configuration statements for the Lifeline
Agent - most defaults are selected.
#
#####

Following specifies the IP address and port of the primary advisor
that this agent connects to.
advisor_id 10.10.10.1..8181

Specifies the local IP address and port this agent binds to before
connecting to the primary advisor. Uncomment the statement that
applies to the image that the Agent is running on.
#host_connection 192.10.1.1..4000 # sys_a
#host_connection 192.10.1.2..4000 # sys_b
#host_connection 192.10.2.1..4000 # sys_c
#host_connection 192.10.2.2..4000 # sys_d
```

*Figure 10. Sample configuration statements for the Lifeline Agent*

The Lifeline Agent accesses files within the UNIX System Services shell, so you need to define an OMVS segment for the Lifeline Agent. Assuming that the Lifeline Agent is started using a procedure called AQSAGE, you can use the following JCL snippet to define the OMVS segment:

```
//EZARACF JOB MSGLEVEL=(1,1),MSGCLASS=A,CLASS=A
//DAEMONS EXEC PGM=IKJEFT01
//SYSTSPRT DD SYSOUT=*
//SYSTSIN DD *
 ADDUSER AQSAGE DFLTGRP(OMVSGRP) OMVS(UID(0) HOME('/'))
 RDEFINE STARTED AQSAGE.* STDATA(USER(AQSAGE))
 SETROPTS RACLIST(STARTED) REFRESH
/*
```

According to previous samples, you need to update the TCPIP profile on the image owning the distributable dynamic VIPA in the following way:

```

VIPADYNAMIC
; Uncomment statement that applies to the image where the z/OS sysplex distributor
; is being started
;
; Site1 definitions
; VIPADEFINE 255.255.255.255 10.10.1.1
; VIPADIST DISTMETHOD SERVERWLM 10.10.1.1 PORT 80 DESTIP ALL
;
; Site2 definitions
; VIPADEFINE 255.255.255.255 10.10.2.1
; VIPADIST DISTMETHOD SERVERWLM 10.10.2.1 PORT 80 DESTIP ALL
ENDVIPADYNAMIC

```

## Multi-site Workload Lifeline configuration Example 2

The following figure shows an example of the Multi-site Workload Lifeline configuration where an Active/Standby workload uses a customized load balancer to route requests within a site. It also shows how to configure the Lifeline Advisors and Lifeline Agents to work in such an environment.

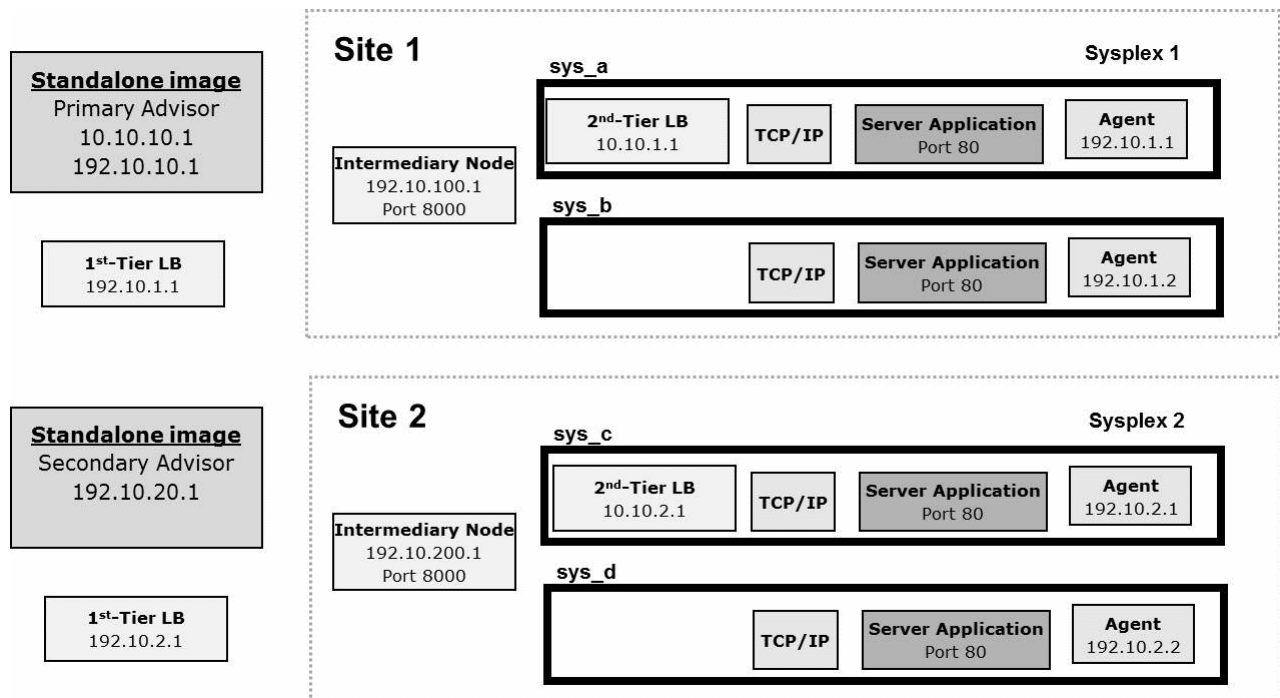


Figure 11. Multi-site Workload Lifeline configuration Example 2

To configure the previous sample environment shown in Figure 11, first repeat the initial five tasks from Example 1.

### Sample configuration statements for the Lifeline Advisor

You can use the following sample configuration file to configure the Lifeline Advisor for Example 2. Use this configuration file for the Advisors on both the primary and secondary controllers.

```

#####
#
This file contains sample configuration statements for the Lifeline
Advisor - using default settings in most cases.
#
#####

Following specifies the port which the primary advisor will listen
on for connections from agents.
agent_connection_port 8181

Following specifies which agents are allowed to connect to the
primary advisor.
agent_id_list
{
 192.10.1.1..4000 # IP address and port for sys_a
 192.10.1.2..4000 # IP address and port for sys_b
 192.10.2.1..4000 # IP address and port for sys_c
 192.10.2.2..4000 # IP address and port for sys_d
}

Following specifies the port which the primary advisor will listen
on for connections from a secondary advisor.
advisor_connection_port 8000

Following specifies which secondary advisors are allowed to connect
to the primary advisor (should contain at least the IP address of this
host).
advisor_id_list
{
 192.10.10.1 # IP address for Advisor on primary controller
 192.10.20.1 # IP address for Advisor on secondary controller
}

Following specifies the IPv4 address and port the primary advisor
listens on for connections from load balancers.
lb_connection_v4 10.10.10.1..3860

Following specifies which load balancers are allowed to connect to
the primary advisor.
lb_id_list
{
 192.10.1.1 # IP address of LB in Site1
 192.10.2.1 # IP address of LB in Site2
}

Following specifies the IP address and site name (i.e. sysplex name)
that identifies each z/OS sysplex distributor
used to route the workload, the port number of the server
application used for the workload, and the workload name.
These entries represent the load balancer server groups
registered by the first-tier load balancers.
cross_sysplex_list
{
 10.10.1.1..80,SITE1,WORKLOAD1 # HTTP Server on Site1
 10.10.2.1..80,SITE2,WORKLOAD1 # HTTP Server on Site2
}

Following specifies the IP address and site name (i.e. sysplex name)
that identifies each intermediary node used
to route the workload, the port number to reach the
intermediary node, and the workload name.
These entries represent the load balancer server groups
registered by the first-tier load balancers.
intermediary_node_list
{
 192.10.100.1..8000,SITE1,WORKLOAD1 # Intermediary node on Site1
 192.10.200.1..8000,SITE2,WORKLOAD1 # Intermediary node on Site2
}

```

Figure 12. Sample configuration statements for the Lifeline Advisor

Follow the same steps in Example 1 to define an OMVS segment for the Advisor and the VIPARANGE DVIPA on both stand-alone LPARs.

### Sample configuration statements for the Lifeline Agent

Use the same Lifeline Agent configuration file from Example 1, and follow the same steps in Example 1 to define an OMVS segment for the Agent and the z/OS sysplex distributor in both sites.

### Multi-site Workload Lifeline configuration Example 3

The following figure shows an example of a configuration of Multi-site Workload Lifeline where two workloads are defined, one as an Active/Standby workload and the other as an Active/Query workload. Both workloads use the z/OS sysplex distributor to route requests within a site. The following figure describes how to configure the Lifeline Advisors and Lifeline Agents to work in such an environment.

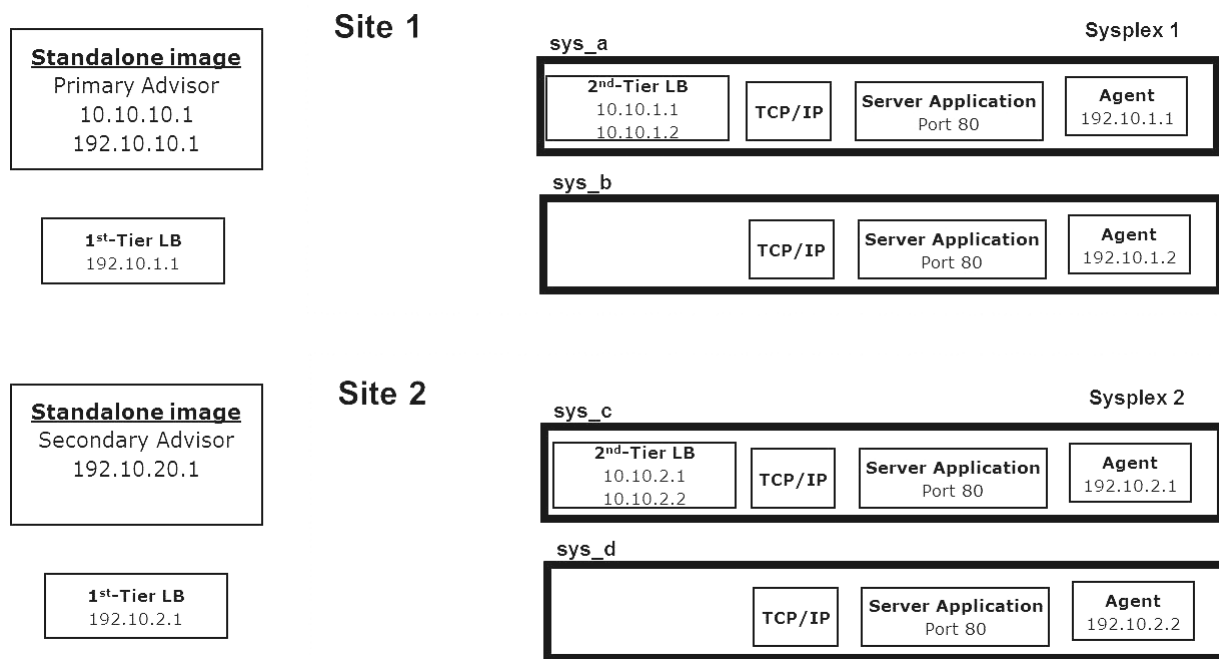


Figure 13. Multi-site Workload Lifeline configuration Example 3

To configure the sample environment shown in Figure 13, complete the following tasks:

1. Configure and start the Lifeline Advisor on the primary controller in the primary role. The primary Advisor listens on dynamic VIPA (DVIPA) address 10.10.10.1, which is defined in the VIPARANGE statement.
2. Configure and start the Lifeline Advisor on the secondary controller, in the secondary role. The secondary Advisor uses static VIPA address 192.10.20.1 to communicate with the primary Advisor.
3. Define two distributable DVIPAs, 10.10.1.1 and 10.10.1.2, on system sys\_a in sysplex Site1, and allow both sys\_a and sys\_b to be targets of these DVIPAs. 10.10.1.1 will be used for the Active/Standby workload and 10.10.1.2 will be used for the Active/Query workload.

4. Define two distributable DVIPAs, 10.10.2.1 and 10.10.2.2, on system sys\_c in sysplex Site2, and allow both sys\_c and sys\_d to be targets of these DVIPAs. 10.10.2.1 will be used for the Active/Standby workload and 10.10.2.2 will be used for the Active/Query workload.
5. Configure and start the Lifeline Agents on each of the images in Site 1 and Site 2, by using the static VIPA that is defined in that image (192.10.1.1 on sys\_a, 192.10.1.2 on sys\_b, 192.10.2.1 on sys\_c, and 192\_10.2.2 on sys\_d).

### **Sample configuration statements for the Lifeline Advisor**

You can use the following sample configuration file to configure the Lifeline Advisor for Example 3. Use this configuration file for the Advisors on both the primary and secondary controllers.

```

#####
#
This file contains sample configuration statements for the
Lifeline Advisor - using default settings in most cases.
#
#####

Following specifies the port which the primary advisor will
listen on for connections from agents.
agent_connection_port 8181

Following specifies which agents are allowed to connect to
the primary advisor.
agent_id_list
{
 192.10.1.1..4000 # IP address and port for sys_a
 192.10.1.2..4000 # IP address and port for sys_b
 192.10.2.1..4000 # IP address and port for sys_c
 192.10.2.2..4000 # IP address and port for sys_d
}

Following specifies the port which the primary advisor will
listen on for connections from a secondary advisor.
advisor_connection_port 8000
Following specifies which secondary advisors are allowed to
connect to the primary advisor (should contain at least the IP
address of this host).
advisor_id_list
{
 192.10.10.1 # IP address for Advisor on primary controller
 192.10.20.1 # IP address for Advisor on secondary controller
}

Following specifies the IPv4 address and port the primary
advisor listens on for connections from load balancers.
lb_connection_v4 10.10.10.1..3860

Following specifies which load balancers are allowed to
connect to the primary advisor.
lb_id_list
{
 192.10.1.1 # IP address of LB in Site1
 192.10.2.1 # IP address of LB in Site2
}

Following specifies the IP address and site name (i.e.
sysplex name) that identifies each z/OS sysplex distributor
used to route the workload, the port number of the server
application used for the workload, and the workload name.
These entries represent the load balancer server groups
registered by the first-tier load balancers.
cross_sysplex_list
{
 10.10.1.1..80,SITE1,WORKLOAD1 # HTTP Server on Site1 -
 # Active/Standby
 10.10.2.1..80,SITE2,WORKLOAD1 # HTTP Server on Site2 -
 # Active/Standby
 10.10.1.2..80,SITE1,WORKLOAD2 # HTTP Server on Site1 -
 # Active/Query
 10.10.2.2..80,SITE2,WORKLOAD2 # HTTP Server on Site2 -
 # Active/Query
}

Following specifies the Active/Query workload, its
associated Active/Standby workload, the distribution type
and distribution option, and timeout for persistent
connections. These entries represent the workloads defined
in the cross_sysplex_list that are classified as
Active/Query workloads.
query_workload_list
{
 WORKLOAD2,WORKLOAD1,DYNAMIC,TOACTIVE,0
}

```

*Figure 14. Sample configuration statements for the Lifeline Advisor*

Follow the same steps in Example 1 to define an OMVS segment for the Advisor and the VIPARANGE DVIPA on both stand-alone LPARs.

## **Sample configuration statements for the Lifeline Agent**

Use the same Lifeline Agent configuration file from Example 1, and follow the same steps in Example 1 to define an OMVS segment for the Agent and the z/OS sysplex distributor in both sites.



---

## Appendix D. Sample AT-TLS configuration policies

Use AT-TLS to enable TLS before starting the TCP/IP stacks and the Lifeline Advisor and Lifeline Agent applications.

### Example AT-TLS Policy for a Lifeline Advisor to peer Lifeline Advisor connection

```
TTLRule AdvisorToPeerRule
{
 LocalPortRange 8000
 Direction Inbound
 TTLGroupActionRef AdvisorGroup
 TTLEnvironmentActionRef AdvisorToPeerEnvironment
}
TTLGroupAction AdvisorGroup
{
 TTLEnabled On
}
TTLEnvironmentAction AdvisorToPeerEnvironment
{
 TTLSKeyRingParms
 {
 Keyring advisor_key_ring
 }
 TTLEnvironmentAdvancedParms
 {
 # TTLS will verify a user ID is associated with certificate
 ClientAuthType SAFCheck
 ApplicationControlled On
 }
 HandshakeRole ServerWithClientAuth
 Trace 7
}

TTLRule PeerToAdvisorRule
{
 RemotePortRange 8000
 Direction Outbound
 TTLGroupActionRef AdvisorGroup
 TTLEnvironmentActionRef PeerToAdvisorEnvironment
}
TTLGroupAction AdvisorGroup
{
 TTLEnabled On
}
TTLEnvironmentAction PeerToAdvisorEnvironment
{
 TTLSKeyRingParms
 {
 Keyring advisor_key_ring
 }
 HandshakeRole Client
 Trace 7
}
```

### Example AT-TLS Policy for a Lifeline Advisor to Lifeline Agent connection

```
TTLRule AdvisorToAgentRule
{
 LocalPortRange 8181
 Direction Inbound
```

```

TTLSTLSGroupActionRef AdvisorGroup
TTLSEnvironmentActionRef AdvisorToAgentEnvironment
}
TTLSTLSGroupAction AdvisorGroup
{
TTLSEnvironmentEnabled On
}
TTLSEnvironmentAction AdvisorRoAgentEnvironment
{
TTLSTLSKeyRingParms
{
Keyring advisor_key_ring
}
}
TTLSEnvironmentAdvancedParms
{
TTLS will verify a user ID is associated with certificate
ClientAuthType SAFCheck
ApplicationControlled On
}
HandshakeRole ServerWithClientAuth
Trace 7
}

```

```

TTLSTLSRule AgentToAdvisorRule
{
RemotePortRange 8181
Direction Outbound
TTLSTLSGroupActionRef AgentGroup
TTLSEnvironmentActionRef AgentToAdvisorEnvironment
}
TTLSTLSGroupAction AgentGroup
{
TTLSEnvironmentEnabled On
}
TTLSEnvironmentAction AgentToAdvisorEnvironment
{
TTLSTLSKeyRingParms
{
Keyring agent_key_ring
}
HandshakeRole Client
Trace 7
}

```

### **Example AT-TLS Policy for a Lifeline Advisor to load balancer connection**

```

TTLSTLSRule AdvisorToLBRule
{
LocalPortRange 3860
LocalAddr 10.10.10.1
Direction Inbound
TTLSTLSGroupActionRef AdvisorGroup
TTLSEnvironmentActionRef AdvisorToLBEnvironment
}
TTLSTLSGroupAction AdvisorGroup
{
TTLSEnvironmentEnabled On
}
TTLSEnvironmentAction AdvisorToLBEnvironment
{
TTLSTLSKeyRingParms
{
Keyring advisor_key_ring
}
}
TTLSEnvironmentAdvancedParms
{

```

```
TTLS will verify a user ID is associated with certificate
ClientAuthType SAFCheck
ApplicationControlled On
}
HandshakeRole ServerWithClientAuth
Trace 7
}
```



---

## Appendix E. Accessibility

Publications for this product are offered in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience problems, send an e-mail to [mhvrcfs@us.ibm.com](mailto:mhvrcfs@us.ibm.com) or write to:

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Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, to use software products successfully. The major accessibility features in z/OS enable users to:

- Use assistive technologies such as screen readers and screen magnifier software
- Operate specific or equivalent features using only the keyboard
- Customize display attributes such as color, contrast, and font size

### Using assistive technologies

Assistive technology products, such as screen readers, function with the user interfaces found in z/OS. Consult the assistive technology documentation for specific information when using such products to access z/OS interfaces.

### Keyboard navigation of the user interface

Users can access z/OS user interfaces using TSO/E or ISPF. See *z/OS TSO/E Primer*, *z/OS TSO/E User's Guide*, and *z/OS ISPF User's Guide Vol I* for information about accessing TSO/E and ISPF interfaces. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.



---

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