



AutoPilot® M6 Plug-in for IBM MQ Installation and User's Guide

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Chapter 1: Introduction

Welcome to the AutoPilot M6 Plug-in for IBM MQ Guide. This guide explains how to install, set-up and use the IBM MQ plug-in.

The components and plug-ins in AutoPilot M6 are designed to work together and run simultaneously without interference or performance degradation. Based on the license options you have exercised, all plug-ins can be installed with the base installation, allowing custom installation on each Node and/or Domain Server.

1.1 How This Book is Organized

- [Chapter 1:](#) Identifies the users and history of the document, additional and alternate documents, system requirements, and support and reference information.
- [Chapter 2:](#) Contains a list of event and poll-based monitors that make up the IBM MQ plug-in.
- [Chapter 3:](#) Provides instructions for installing and upgrading installation of M6 Plug-in for IBM MQ software. Installation instructions as they apply to all supported platforms and operating systems are provided.
- [Chapter 4:](#) Provides user instructions and deployment options and use of the plug-in to include deployment.
- [Chapter 5:](#) Outlines and describes the Business Views supplied with the IBM MQ Plug-in. The supplied Business Views can be user customized.
- [Chapter 6:](#) Provides Performance Tuning information to help keep the CPU and Memory usage down.
- [Chapter 7:](#) Describes IBM MQ Metrics collected by IBM MQ Monitors.
- [Appendix A:](#) Provides a detailed list of all reference information required for the installation and support of the IBM MQ Plug-in.
- [Appendix B:](#) Identifies and defines typographical and naming conventions.
- [Glossary:](#) Contains a listing of unique and common acronyms and words and their definitions that are used in AutoPilot.
- [Index:](#) Contains an alphanumeric cross-reference index of all topics and subjects of importance within this guide.

1.2 History of This Document

Table 1-1. Document History

Release Date:	Document Number	Summary
December 2007	WMQM6 600.001	Initial release
April 2009	WMQM6 600.002	Add Configuring Custom IBM MQ Universal Agents
May 2017	WMQM6 600.003	Support wildcard for queues on a given queue manager (Mantis 15083)
August 2017	WMQM6 600.004	Update Nastel's phone numbers and street address
July 2019	M6/MQ 664.001	Update Table 7-25. Other miscellaneous updates including name changes, figures and document version number format.
July 2020	M6/MQ 10.001	Version updates in section 3.2.1.
September 2020	M6/MQ 10.002	Add "Search string message limit," "Search string text," and "Search type" to Table 4-6.
May 2022	M6/MQ 10.002.1	Updated document title to <i>Autopilot M6 Plug-in for IBM MQ Installation and User's Guide</i>

1.3 User Feedback

Nastel encourages all Users and Administrators of AutoPilot M6 to submit comments, suggestions, corrections and recommendations for improvement for all AutoPilot M6 documentation. Please send your comments via e-mail to: support@nastel.com. You will receive a written response, along with status of any proposed change, update, or correction.

1.4 Related Documents

The complete list of related documents can be found in [Appendix A](#) of this guide.

1.5 Release Notes

See README.HTM file on installation media or AutoPilot M6 installation directory.

1.6 Intended Audience

Install/Admin: This document is intended for personnel installing and customizing IBM MQ plug-in. The installer should be familiar with:

- AutoPilot 6.0 installation procedures
- Procedures for installing software on the target platform such as Windows, UNIX, etc.
- Basic understanding of TCP/IP

1.7 AutoPilot M6 System Requirements

The hardware and software for this plug-in are the same as those for AutoPilot M6. Refer to the Installation or Administrator's Guides for detailed information.

1.8 Terms and Abbreviations

A list of Terms and Abbreviation used in this document is located in the [Glossary](#).

1.9 Technical Support

If you need additional technical support, you can contact Nastel by telephone or by e-mail.

To contact Nastel technical support by telephone, call **800-963-9822 ext. 1**. If you are calling from outside the United States, dial either **001-516-801-2100**.

To contact Nastel technical support by e-mail, send a message to support@nastel.com. You can also contact Nastel support via the support website.

To access online web-based Nastel automated support system (user ID/Password required), go to: <http://support.nastel.com/>. Contact your local AutoPilot M6 Administrator for further information.

1.10 Conventions

Refer to [Appendix B](#) for typographical and naming conventions used in this guide.

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Chapter 2: About M6 Plug-in for IBM MQ

IBM MQ plug-in is a collection of event and poll based monitors that collect IBM MQ events, run-time and performance information about IBM MQ.

- IBM MQ plug-in requires AutoPilot M6 for IBM MQ installation (see [Plug-in Requirements](#))
- Communicates directly with AutoPilot M6 for IBM MQ workgroup servers.

The IBM MQ plug-in provides the below set of monitors:

- If using WGS 6, all monitors listed below will need to be used.
 - If using WGS 10, only the first monitor listed, IBM MQ Gateway Expert and Event Monitor, is required. All other monitors are optional. The monitors with the asterisk (*) are included in the Plug-in for IBM MQ for WGS 10. Other monitors can be created with the Deploy Expert capability of the Enterprise Manager.
- IBM MQ Gateway Expert and Event Monitor (WGS_Event_Monitor for WGS 10, WS_Monitor for WGS 6)
 - IBM MQ Universal Agent Channel Monitor (ChI_Monitor) *
 - IBM MQ Universal Agent Channel Status Monitor (ChI_Status_Monitor)
 - IBM MQ Universal Agent Cluster Queue Manager Monitor (ClusQmgr_Monitor) *
 - IBM MQ Universal Agent Listener Status Monitor (Lsr_Status_Monitor)
 - IBM MQ Node Monitor (Node_Monitor)
 - IBM MQ Universal Agent Queue Manager Connections Monitor (QM_Conns_Monitor)
 - IBM MQ Universal Agent Queue Manager Handles Monitor (QM_Handles_Monitor)
 - IBM MQ Universal Agent Queue Manager Monitor (QM_Monitor) *
 - IBM MQ Universal Agent Queue Manager Status Monitor (QM_Status_Monitor)
 - IBM MQ Queue Manager Monitor (Qmgr_Monitor) *
 - IBM MQ Universal Agent Que Handles Monitor (Que_Handles_Monitor)
 - IBM MQ Universal Agent Queue Monitor (Que_Monitor) *
 - IBM MQ Universal Agent Queue Status Monitor (Que_Status_Monitor)
 - IBM MQ Reset Queue Statistics Expert (Reset_Que_Statistics)
 - IBM MQ Universal Agent Services Status Monitor (Svr_Status_Monitor)

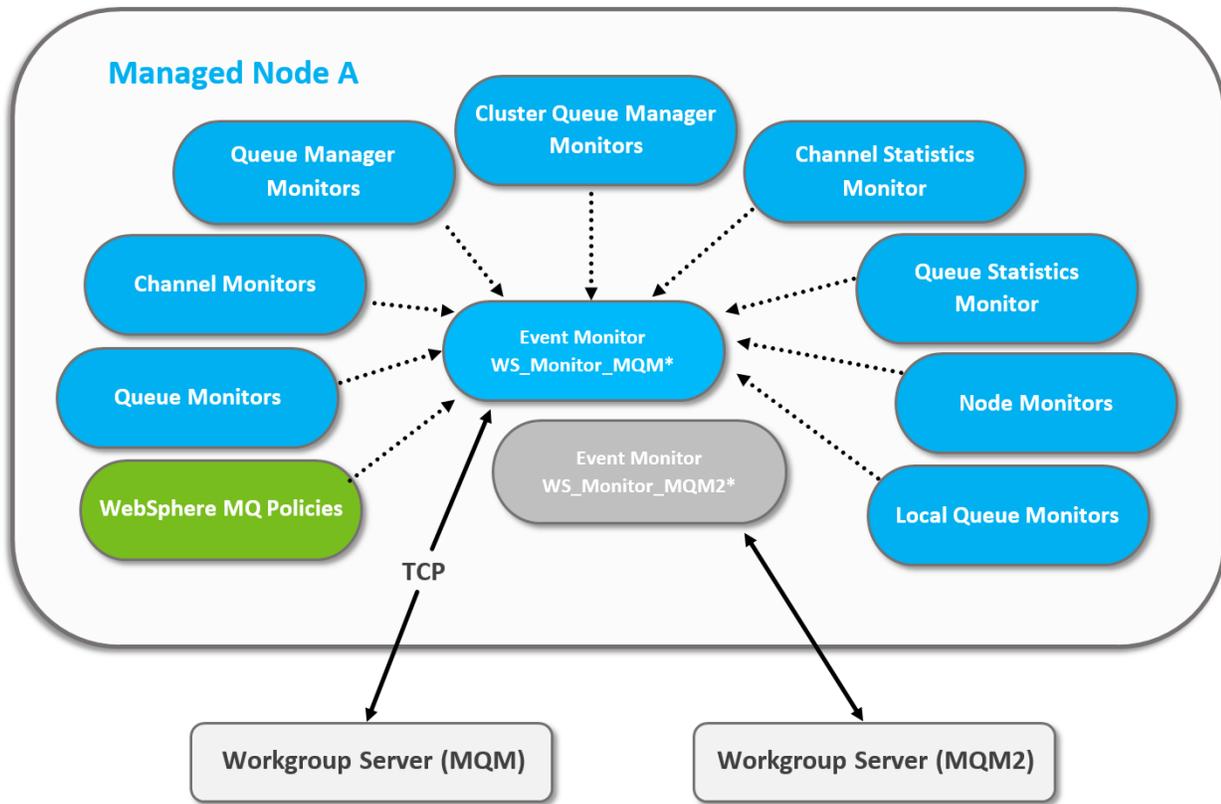


Figure 2-1. IBM MQ Plug-in Architecture

*WS_Monitor is the gateway expert for M6 v6.x. For M6 v10.x, it is WGS_Event_Monitor[_workgroup].

All monitors communicate with the M6 for IBM MQ workgroup servers through an M6 for IBM MQ gateway expert. At least one gateway expert/event monitor must be deployed on a CEP node in order to monitor IBM MQ.

Chapter 3: Installation

This chapter contains general information related to installation and upgrading installations of IBM MQ Plug-in and IBM MQ Resource Pack for M6.

3.1 Installation

3.1.1 Installation Materials

The AutoPilot M6 installation media contains all required components for the installation and implementation of the IBM MQ Plug-in and Resource Pack for M6. There are no special requirements for the initial installation; it is installed as a standard component of M6 6.0 and higher. All installation related documents are found on the AutoPilot M6 installation media.

3.1.2 Licensing Information

A copy of the standard Licensing Agreement is imbedded in the AutoPilot M6 installation software and is provided as a text file on the installation media. The formal licensing agreement has been furnished in the purchase agreement package.

3.2 IBM MQ Plug-in Installation

This section provides detailed instructions for installing and upgrading IBM MQ plug-in for M6. There are two versions of the plug-in: one for WGS v6 and one for WGS v10.

	NOTE: IBM MQ plug-in comes pre-installed with AutoPilot Enterprise base product.
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3.2.1 Install or Update IBM MQ Plug-in and IBM MQ Resource Pack

1. Close/stop all AutoPilot M6 related applications and services on the target platform.
2. Place all files into:
[AUTOPILOT_HOME]\updates directory.
3. At the command prompt run:
 - a. For WGS 6, run this resource pack set:
[AUTOPILOT_HOME]\bin\pkgman ..\updates\AP_WMQ-6.x.x.pkg
[AUTOPILOT_HOME]\bin\pkgman ..\updates\AP_WMQRP-6.x.x.pkg
 - b. For WGS 10, run this resource pack set:
[AUTOPILOT_HOME]\bin\pkgman ..\updates\AP_IBMMQ-10.x.x.pkg
[AUTOPILOT_HOME]\bin\pkgman ..\updates\AP_IBMMQRP-10.x.x.pkg
4. Verify installation: [AUTOPILOT_HOME]\bin\pkgman -verify "WMQ-plugin"
[AUTOPILOT_HOME]\bin\pkgman -verify "WMQ-Resource Pack"

3.2.2 IBM MQ Plug-in Installation/Updates Locations

The plug-in installation or update must be performed on all CEP server nodes where IBM MQ plug-in is deployed.

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Chapter 4: Using the IBM MQ Plug-in

4.1 Deployment Options

IBM MQ monitors are deployed using the following options:

- **One-to-one:** A single CEP (complex event processor) server with one set of IBM MQ monitors per workgroup server. In this case a single IBM MQ Event Monitor is deployed on a CEP server node running on the same machine as the workgroup server. A CEP server is dedicated to monitor a single workgroup server.
- **Many-to-many:** Multiple CEP servers with multiple sets of IBM MQ Event Monitors and related monitors are configured for multiple workgroup servers. All could run on the same machine having adequate number of processors and speed.

	NOTE:	One-to-one is recommended when the target workgroup server(s) manages a medium to large network of IBM MQ servers (ten or more servers). One-to-many is adequate when monitoring multiple workgroup servers each fewer than ten servers.
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4.2 IBM MQ Monitor Naming Conventions

	NOTE:	A complete list of typographic and naming conventions is listed in Appendix B .
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IBM MQ monitors follow the naming conventions listed below. If you are using multiple workgroups, you will need one set of the below monitors for each workgroup, plus 1 CEP Server instance per workgroup.

Table 4-1. IBM MQ Monitor Naming Conventions

Policy/Monitor Name if Using One Workgroup	Description	Convention Using Workgroup Name	Example Monitor Names if Using Two Workgroups
WGS_Event_Monitor	Name used for IBM MQ Event Monitor.	WGS_Event_Monitor_<GROUP>, where GROUP is the name of the target workgroup server.	WGS_Event_Monitor_MQM, WGS_Event_Monitor_MQMDEV
Chl_Monitor	Name used for IBM MQ Universal Agent Channel Monitor.	WGS_Chل_Monitor_<GROUP>	WGS_Chل_Monitor_MQM, WGS_Chل_Monitor_MQMDEV
Chl_Status_Monitor	Name used for IBM MQ Universal Agent Channel Status Monitor.	WGS_Chل_Status_Monitor_<GROUP>	WGS_Chل_Status_Monitor_MQM, WGS_Chل_Status_Monitor_MQMDEV
ClusQmgr_Monitor	Name used for IBM MQ Universal Agent Cluster Queue Manager Monitor.	WGS_ClusQmgr_Monitor_<GROUP>	WGS_ClusQmgr_Monitor_MQM, WGS_ClusQmgr_Monitor_MQMDEV
Lsr_Status_Monitor	Name used for IBM MQ Universal Agent Listener Status Monitor.	WGS_Lsr_Status_Monitor_<GROUP>	WGS_Lsr_Status_Monitor_MQM, WGS_Lsr_Status_Monitor_MQMDEV
Node_Monitor	Name used for IBM MQ Node Monitor.	WGS_Node_Monitor_<GROUP>	WGS_Node_Monitor_MQM, WGS_Node_Monitor_MQMDEV
QM_Conns_Monitor	Name used for IBM MQ Universal Agent Queue Manager Connections Monitor.	WGS_QM_Conns_Monitor_<GROUP>	WGS_QM_Conns_Monitor_MQM, WGS_QM_Conns_Monitor_MQMDEV
QM_Handles_Monitor	Name used for IBM MQ Universal Agent Queue Manager Handles Monitor.	WGS_QM_Handles_Monitor_<GROUP>	WGS_QM_Handles_Monitor_MQM, WGS_QM_Handles_Monitor_MQMDEV
QM_Monitor	Name used for IBM MQ Universal Agent Queue Manager	WGS_QM_Monitor_<GROUP>	WGS_QM_Monitor_MQM, WGS_QM_Monitor_MQMDEV

Table 4-1. IBM MQ Monitor Naming Conventions

Policy/Monitor Name if Using One Workgroup	Description	Convention Using Workgroup Name	Example Monitor Names if Using Two Workgroups
	Monitor.		
QM_Status_Monitor	Name used for IBM MQ Universal Agent Queue Manager Status Monitors.	WGS_QM_Status_Monitor_<GROUP>	WGS_QM_Status_Monitor_MQM, WGS_QM_Status_Monitor_MQMDEV
Qmgr_Monitor	Name used for IBM MQ Queue Manager Monitor.	WGS_Qmgr_Monitor_<GROUP>	WGS_Qmgr_Monitor_MQM, WGS_Qmgr_Monitor_MQMDEV
Que_Handles_Monitor	Name used for IBM MQ Universal Agent Queue Handles Monitor.	WGS_Que_Handles_Monitor_<GROUP>	WGS_Que_Handles_Monitor_MQM, WGS_Que_Handles_Monitor_MQMDEV
Que_Monitor	Name used for IBM MQ Universal Agent local Queue Monitor.	WGS_Que_Monitor_<GROUP>	WGS_Que_Monitor_MQM, WGS_Que_Monitor_MQMDEV
Que_Status_Monitor	Name used for IBM MQ Universal Agent Queue Status Monitor.	WGS_Que_Status_Monitor_<GROUP>	WGS_Que_Status_Monitor_MQM, WGS_Que_Status_Monitor_MQMDEV
Reset_Queue_Statistics	Name used for IBM MQ Reset Queue Statistics.	WGS_Reset_Queue_Statistics_<GROUP>	WGS_Reset_Queue_Statistics_MQM, WGS_Reset_Queue_Statistics_MQMDEV
Svr_Status_Monitor	Name used for IBM MQ Universal Agent Service Status Monitor.	WGS_Svr_Status_Monitor_<GROUP>	WGS_Svr_Status_Monitor_MQM, WGS_Svr_Status_Monitor_MQMDEV

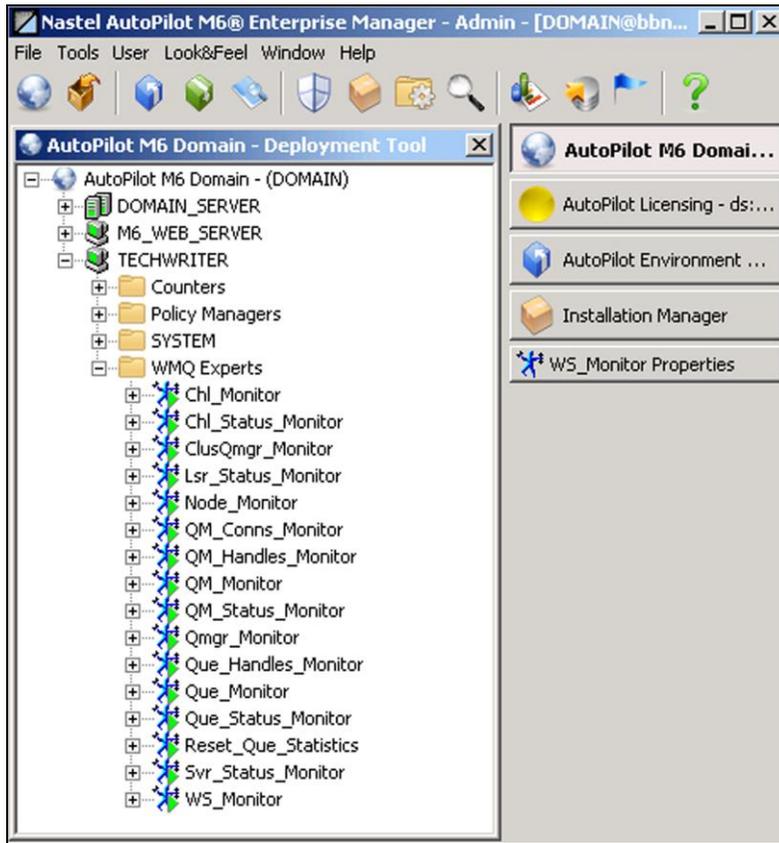


Figure 4-1. IBM MQ Monitors for WGS 6

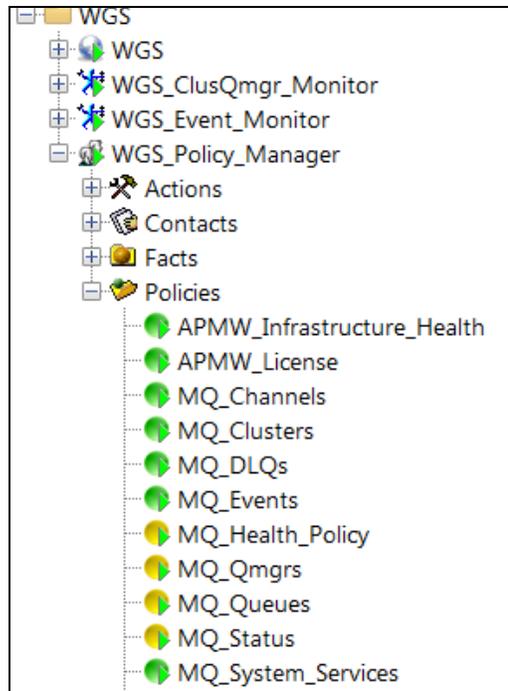


Figure 4-2 IBM MQ Monitor Policies for WGS 10

4.3 Database Connectivity

The following IBM MQ plug-in components integrate with SQL databases.

	CAUTION!	AutoPilot M6 has been tested only with the JDBC drivers listed below. Problems may arise if other drivers are used.
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- IBM MQ Queue Statistics Monitor
- IBM MQ Channel Statistics Monitor
- Reset Queue Statistics

Table 4-2. Supported Databases and Corresponding JDBC Drivers

Database	JDBC Driver	Data Source Name (DSN) or URL Format
JDBC-ODBC Bridge	sun.jdbc.odbc.JdbcOdbcDriver	jdbc:odbc:DSN [1]
MS SQL Server	net.sourceforge.jtds.jdbc.Driver	jdbc:jtds:sqlserver://host:port/dbname [2]
Sybase	net.sourceforge.jtds.jdbc.Driver	jdbc:jtds:sybase://host:port/dbname [2]
Oracle	oracle.jdbc.driver.OracleDriver	jdbc:oracle:thin[:user/password]@hostname:port:sid or using a service name instead of SID: jdbc:oracle:thin[:user/password]@//host:1521/ servicename [3]
Hypersonic SQL	org.hsqldb.jdbcDriver	jdbc:hsqldb:hsq://host:port/dbname [4]
DB2 UDB	COM.ibm.db2.jdbc.net.DB2Driver	jdbc:db2://host:port/dbname [5]
Informix	com.informix.jdbc.IfxDriver	jdbc:informix-sqli://host:port/dbname [6]
MySQL	com.mysql.jdbc.Driver	jdbc:mysql://host:port/schema [7]

	NOTE:	Other databases, which are not listed above, could be used either via JDBC-ODBC bridge or by installing database specific JDBC driver within AutoPilot M6. JDBC drivers can be obtained directly from the database vendor.
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Table 4-2 References

1. <https://www.infocaptor.com/dashboard/jdbc-odbc-drivers-connections-and-strings-url>
See “JDBC-ODBC Bridge”
<http://www.java2s.com/Code/Java/Database-SQL-JDBC/jdbcodbcbridgeconnectionstring.htm>
See “JDBC ODBC Bridge Connection String”
2. jTDS is an open source 100% pure Java (type 4) JDBC 3.0 driver for Microsoft SQL Server and Sybase Adaptive Server Enterprise. See: <http://jtds.sourceforge.net/index.html>
<http://jtds.sourceforge.net/fag.html#urlFormat>
3. https://docs.oracle.com/cd/B28359_01/java.111/b31224/urls.htm, see “Database URLs and Database Specifiers”
https://razorsql.com/docs/help_oracle.html, see “Oracle Thin JDBC Driver”
4. <http://hsqldb.org/doc/2.0/guide/running-chapt.html>, see “Example 1.2. Java code to connect to the local http Server”
<http://hsqldb.org/doc/2.0/guide/dbproperties-chapt.html>, see “Table 13.4”
5. https://www.ibm.com/support/knowledgecenter/en/SSEPEK_10.0.0/java/src/tpc/imjcc_tivjccn.html
6. https://www.ibm.com/support/knowledgecenter/en/SSGU8G_12.1.0/com.ibm.jdbc_pg.doc/ids_jdbc_036.htm
7. <https://dev.mysql.com/doc/connector-j/5.1/en/connector-j-reference-url-format.html>

4.3.1 Installing JDBC Drivers

To install or update JDBC driver (s) (all drivers must be packaged as JAR files):

1. Stop all AutoPilot M6 related applications and services on the target platform.
2. Copy all files (.jar, *.zip) into [AUTOPILOT_HOME]\lib directory.

	NOTE:	Refer to vendor specific JDBC driver documentation for more information on JDBC driver name, DSN format and usage.
---	--------------	--

3. Restart all AutoPilot M6 related applications and services on the target platform.

4.4 IBM MQ Experts

IBM MQ experts collect real-time user-specified IBM MQ attributes and publish them as facts. Most experts are *universal agents* which execute any MQSC command.

	NOTE: Poll-based IBM MQ experts may cause high CPU consumption if the Discovery Period is very short, for example less than 30 seconds. Please follow performance guidelines outlined in Performance Tuning .
---	--

There are two types of experts available:

1. **Event based:** Low resource consumption:
IBM MQ Event Monitor (WGS_Event_Monitor for WGS 10, WS_Monitor for WGS 6)
2. **Poll based:** Resource consumption proportional to the number of IBM MQ objects. These experts depend on the IBM MQ Event Monitor to communicate with the workgroup server.
 - IBM MQ Universal Agent Channel Monitor (Chl_Monitor)
 - IBM MQ Universal Agent Channel Status Monitor (Chl_Status_Monitor)
 - IBM MQ Universal Agent Cluster Queue Manager Monitor (ClusQmgr_Monitor)
 - IBM MQ Universal Agent Listener Status Monitor (Lsr_Status_Monitor)
 - IBM MQ Node Monitor (Node_Monitor)
 - IBM MQ Universal Agent Queue Manager Connections Monitor (QM_Conns_Monitor)
 - IBM MQ Universal Agent Queue Manager Handles Monitor (QM_Handles_Monitor)
 - IBM MQ Universal Agent Queue Manager Monitor (QM_Monitor)
 - IBM MQ Universal Agent Queue Manager Status Monitor (QM_Status_Monitor)
 - IBM MQ Queue Manager Monitor (Qmgr_Monitor)
 - IBM MQ Universal Agent Queue Handles Monitor (Que_Handles_Monitor)
 - IBM MQ Universal Agent Queue Monitor (Que_Monitor)
 - IBM MQ Universal Agent Queue Status Monitor (Que_Status_Monitor)
 - IBM MQ Reset Queue Statistics Expert (Reset_Queue_Statistics_Monitor)
 - IBM MQ Universal Agent Service_Status_Monitor (Svr_Status_Monitor)

Since poll based experts may potentially collect tens of thousands of metrics for a large IBM MQ network, it is highly recommended to limit their use and/or scope due to potentially high resource consumption. To compute the number of collected elements:

$$\text{Total} \sim (\#\text{queues} * \#\text{queue_metrics}) + (\#\text{channels} * \#\text{channel_metrics}) + (\#\text{qmrgs} * \#\text{qmrg_metrics}) + \text{etc}$$

	NOTE: AutoPilot M6 CEP servers hosting an IBM MQ plug-in may require a separate machine when monitoring workgroups with a large number of MQ servers.
---	--

4.4.1 Common Parameters

Most IBM MQ experts share a common set of parameters:

	NOTE:	Parameters common to all AutoPilot M6 experts are described in <i>Nastel AutoPilot M6 User's Guide</i> .
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Table 4-3. IBM MQ Expert Common Parameters

Name	Description	Default
General		
Brief description	A short, user-defined, description of the service.	
Context	A user-defined category that will be registered with the domain server.	
Gateway Expert	Name of the IBM MQ Event Monitor used as a gateway to the workgroup server.	WGS_Event_Monitor (for WGS 10; WS_Monitor for WGS 6)
Name	Name that uniquely identifies the service in the domain. The default name is system assigned with the word “service” and 12 random digits. (Example: <code>Service_1236618924953</code>)	
Publish Collected Statistics	Enable/disable this expert for publishing collected statistics as facts. Check to enable only for Queue/Channel (QM) monitors. Disable for Queue/QM Statistics if data is collected in SQL database. This will save on CEP server resources.	Enabled
Publish Summary Only	Enable/disable this expert for publishing summary totals only.	Disabled
About		
Package Title	Implementation title of the source package.	
Package vendor	Name of the implementation vendor.	
Package version	Package version as assigned by the vendor.	
Dependencies		
Platform dependencies	Comma separated list of operating system platforms this expert is dependant on.	
Service dependencies	Comma separated list of services this expert is dependent on.	
Discovery		
Command Timeout	Command timeout in milliseconds. Commands issued to workgroup server will timeout after the specified time interval. The time should be set higher for slow machines or network.	60000
Discovery Period (sec)	For large networks of 20 or more hosts, it is recommended to increase this value to 200-500 seconds. Lower values may cause high CPU consumption.	60
Force Update	Update object information on every discovery.	
Poll delay interval (ms)	Interval in milliseconds. Delay between each request to workgroup server within a single discovery interval. A high value will increase the time it takes to scan all systems. Do not exceed 1000.	200
Queue Manager Filter	Specify a filter. This monitor will scan only queue managers that match this filter. It is recommended to limit the scope when dealing with large networks (based on naming convention).	* (All queue managers)

Table 4-3. IBM MQ Expert Common Parameters

Name	Description	Default
	Example: London.QM.*	
Reconnect Retry Interval (sec)	Workgroup server reconnect interval (in seconds). Reconnect interval controls connection retry frequency, when connection to the workgroup server fails for any reason.	60
Sampling threads	Total number of parallel sampling threads.	2
Server sampling rate (sec)	Rate, in seconds, at which monitor scans for new queue managers and nodes.	600
IBM MQ Node Filter	Specify a filter. This monitor will scan only nodes that match this filter. It is recommended to limit the scope when dealing with large networks (based on naming convention). Example: LONDON*	* (All nodes)
IBM MQ Object Filter	IBM MQ object filter. Refers to queues, channels, and queue managers depending on the type of Expert.	*
Fact Options		
Exclude Fact Filters	Comma separated list of fact paths to exclude during publishing. Example: *SYSTEM*, *FactName*	
Expire facts (ms)	User-defined time (in milliseconds) in which facts that have not been updated within that time automatically expire. 0 means never expire.	0
Fact History Size	Automatically maintain the specified number of samples for each published fact in memory. 0 means no limit.	0
Fact History Time (ms)	Automatically maintain fact history not exceeding specified time (in milliseconds).	0
Include Fact Filters	Comma separated list of fact paths to include during publishing. Example: *SYSTEM*, *FactName*	
Logging		
Audit	Enable/disable service audit trace.	
Log name	Log name associated with the service.	Services
Log service activity	Enable/disable service activity trace.	
Log size (bytes)	Enter log file size if the activity is enabled.	200000
Record Facts	Enable/disable recording for this service.	
Properties		
Exclude Keyword	Do not publish the MQSC facts if keyword/value is present in the MQSC reply. Serves as an exclusion keyword. This field does not support multiple keywords or regular expressions. Only responses that do not contain this keyword are published. Example: DEFTYPE (TEMPDYN), TEMPDYN	
Include Keyword	Publish only if keyword/value is present. Serves as an inclusion keyword. This field does not support multiple keywords or regular expressions. Only responses that contain this keyword are published. DEFTYPE (PREDEFINED)	Predefined
MQSC Command	MQSC Command to be executed. Default setting is used to monitor local queue run-time and configuration parameters. For channels use DISPLAY CHL (*) command. Example: DISPLY QUEUE (*) ALL	
MQSC Fact Update	IBM MQ Command (MQSC) used to update individual facts. Example: DISPLAY QUEUE ('{OBJECT NAME}') TYPE (QLOCAL) ALL	

Table 4-3. IBM MQ Expert Common Parameters

Name	Description	Default
	(See Figure 4-9.)	
Sort Facts By Key	Sort published facts by specified keys, comma separated. For distributed: QUEUE, CHANNEL For z/OS: QUEUE, QSTATUS QUEUE should be used when used with DIS QUEUE (*) command. CHANNEL with DIS CHANNEL (*) command. For z/OS: QSTATUS must be used to display all queues and for proper sorting/ alignment of facts. (See Figure 4-9.)	
Restart-Recovery		
Automatic start	Enable/disable automatic start of this service.	Enabled
Save in registry	Enable/disable save persistent services in registry.xml file.	Enabled
Synchronous Control	Enable/disable synchronous service initiation.	Enabled
Security		
Inherit permissions from owner	Enable/disable inheriting of permissions from the owner's permissions which are applied to the service and displayed in the permission check boxes. If this option is not selected the permissions can be set independently.	Enabled
Owner	User that owns the object. Can be edited by clicking the Change button.	
Permissions	Permissions for users of the same group as the owner and others. Enable/disable as required.	
	Group	Others (Users)
Read	Group members may read/view attributes of an object.	Others may read/view attributes of an object.
Change	Group members may change the attributes of an object.	Others may change the attributes of an object.
Delete	Group members may delete the object.	Others may delete the object.
Control	Group members may execute control actions such as start, stop, and disable.	Others may execute control actions such as start, stop, and disable.
Execute	Group members may execute operational commands on the object.	Others may execute operational commands on the object.

4.4.2 IBM MQ Event Monitor

IBM MQ Event Monitor (WGS_Event_Monitor) is an event-based agent that does not poll the workgroup server. It listens for events published by the workgroup server and publishes events as facts. The WGS_Event_Monitor also serves as a gateway between M6 for IBM MQ workgroup servers v10 and all other IBM MQ plug-in monitors and policies. Therefore, this monitor must be deployed and enabled first in order for other monitors to work. This monitor maintains a connection pool to the workgroup server, the size of which is determined by the Connection settings. (See table below.)

The event monitor collects the following categories of events:

- M6 for IBM MQ events such as object changed, workgroup servers and trace events
- IBM MQ queue manager, queue, performance and channel events

	NOTE:	Event Monitor does not keep an historical record of the received events. Facts maintain only last updated set of metrics per object (see IBM MQ Event Monitor Metrics).
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Requirements

- M6 for IBM MQ workgroup server 6.0 or higher
- Can only connect to one workgroup server
- Multiple event monitors must be defined to handle multiple workgroup servers.

Parameters

The parameters below are unique to IBM MQ Event Monitor.

Table 4-4. IBM MQ Event Monitor Parameters

Parameter	Description	Default	Recommendation
General			
Publish Events	Enable/disable event publishing.	Enabled	
Publish Statistics & Accounting	Enable/disable publishing of IBM MQ statistics and accounting information.	Disabled	
Workgroup Server Host	Host name or IP of the machine where M6 for IBM MQ Workgroup Server is running.	localhost	
Workgroup Server Name	Name of M6 for IBM MQ Workgroup Server that this expert should connect to.	MQM	Contact M6 for IBM MQ system administrator to get the name of the Workgroup Server.
Workgroup Server Port	Port number on which Workgroup Server is listening.	4010	
Authentication			
Authentication	Enable/disable user/password Workgroup Server authentication.	Enabled	
Enable Kerberos	Enable/disable Kerberos authentication.	Disabled	Enable if using Kerberos authentication for M6 for IBM MQ.
Kerberos KDC	Hostname/IP where Kerberos KDC is running.	localhost	
Kerberos Realm	Name of the fully-qualified Kerberos realm.	REALM	
Server Kerberos Name	Kerberos principal name of the Server.	nsqmgr_host	
Workgroup Password	Password used for workgroup authentication.		

Table 4-4. IBM MQ Event Monitor Parameters

Parameter	Description	Default	Recommendation
Workgroup User Name	User name for workgroup authentication.	Admin	
Connection			
Connection Pool Limit	Maximum number of connections that can be allocated at any given moment to the specified IBM MQ Server. All IBM MQ monitors that depend on this Event Monitor share this connection pool.	10	This number should be less than the number of licensed M6 for IBM MQ connections.
Long Reconnect Interval	Number of seconds between each long retry.	10	Should be greater than the Short Reconnect Interval.
Long Reconnect Retries	Number of long reconnect retries to be performed when connection to the IBM MQ Server drops.	3	Upon achieving the limit, the retries to reconnect will stop. To enable connectivity the expert will have to be stopped and restarted.
Short Reconnect Interval	Number of seconds between each short retry.	1	
Short Reconnect Retries	Number of short retries to be performed when connection to the IBM MQ Server drops for any reason.	5	

4.4.3 IBM MQ Universal Agent Monitors

	CAUTION!	This expert is poll based and may cause moderate CPU consumption, if the Discovery Period is very short, for example less than 30 seconds. This expert should be used only in cases when standard events reported by AutoPilot/IBM MQ are not adequate. <i>Example:</i> sampling current queue attributes at specified intervals.
---	-----------------	---

An IBM MQ Universal Agent (UA) monitor collects in real-time IBM MQ attributes and publishes them as facts. It executes any MQSC command defined by the user, such as:

- DISPLAY CHS(*) CURRENT
- DISPLAY QLOCAL(*) IPPROCS OPPROCS CURDEPTH

	NOTE:	Executing MQSC scripts at user specified intervals has been deprecated.
---	--------------	---

A UA monitor depends on the IBM MQ Event Monitor, acting as a gateway, to communicate with an IBM MQ server. Unlike other monitors, a UA monitor can be configured to collect IBM MQ attributes from any IBM MQ object directly from the source, namely the queue manager.

The universal agent keeps a log of all executed scripts in `[AUTOPILOT_HOME]\logs` directory. The name of the log follows this naming convention: `<name>_out.log`, where `<name>` is the name of the universal agent. This log is kept on the system where the agent is deployed.

Requirements

- See [section 4.4.2](#), IBM MQ Event Monitor.
- Instance of IBM MQ Event Monitor defined on the same CEP server node.

Parameters

See [section 4.4.1](#), Common Parameters, for parameters common to all IBM MQ experts.

These UA monitors are as follows:

- IBM MQ Channel Monitor (Chl_Monitor) - collects channel run-time information and publishes statistics as facts.
- IBM MQ Cluster Queue Manager (ClusQmgr_Monitor) monitors MQ clusters.
- IBM MQ Queue (QM_Monitor) monitors M6 for IBM MQ Agent status and publishes them as facts.
- IBM MQ Queue (Que_Monitor) collects queue run-time attributes and publishes them as facts.
- IBM MQ Channel Status Monitor (Chl_Status_Monitor) – monitors for failed or indoubt channels.
- IBM MQ Listener Status Monitor (Lsr_Status_Monitor) – monitors the status of the IBM MQ listener.
- IBM MQ Queue Manager Connections Monitor (QM_Conns_Monitor) – monitors the connections of the Queue Manager.
- IBM MQ Queue Manager Handles Monitor (QM_Handles_Monitor) – monitors the handle status of the queue manager.
- IBM MQ Queue Manager Status Monitor (QM_Status_Monitor) – monitors queue manager status as well as key attributes.
- IBM MQ Queue Handles Monitor (Que_Handles_Monitor) – monitors the handle status of the queue.
- IBM MQ Queue Status Monitor (Que_Status_Monitor) – monitors all the local and transmission queues that have problems.
- IBM MQ Service Status Monitor (Svr_Status_Monitor) – monitors the status of the IBM MQ queue manager services.

4.4.3.1 Configuring Custom IBM MQ Universal Agent Monitors

	NOTE:	A user must have an AP-M6/IBM MQ plug-in installed on the CEP server to be able to deploy a universal agent.
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Use this section if you want to create your own monitor that executes an MQSC command that's not covered by the packaged UA monitors.

To deploy and configure an instance of a universal agent:

1. Right click the desired CEP server node.
2. Select **Deploy Expert > IBM MQ > Universal Agent**.

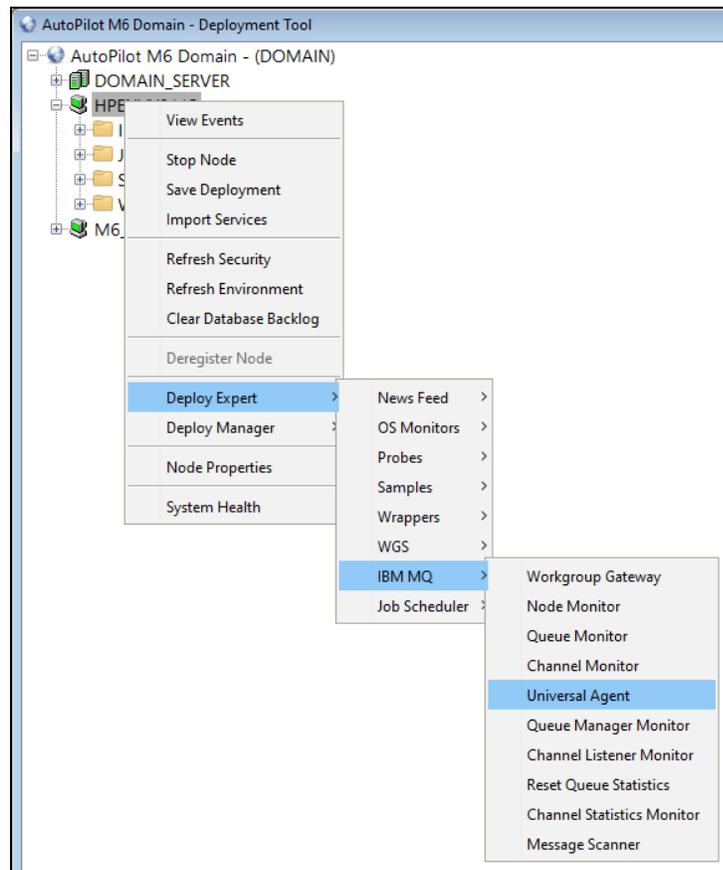


Figure 4-2. Deploying a Universal Agent

3. The *Create Universal Agent* dialogue box is displayed, which allows you to configure a UA. The *General* tab is initially displayed. See [Table 4-3](#) for parameter descriptions.

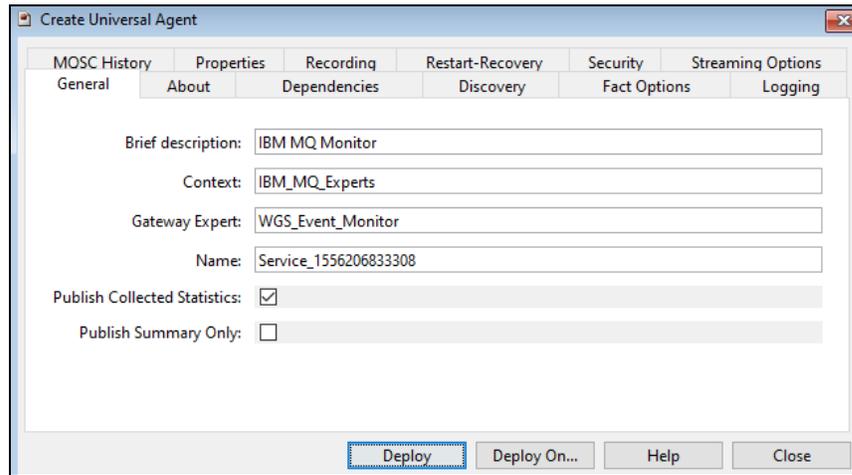


Figure 4-3. Universal Agent General Tab

4. Click the *About* tab. These parameters cannot be edited. See [Table 4-3](#) for parameter descriptions.

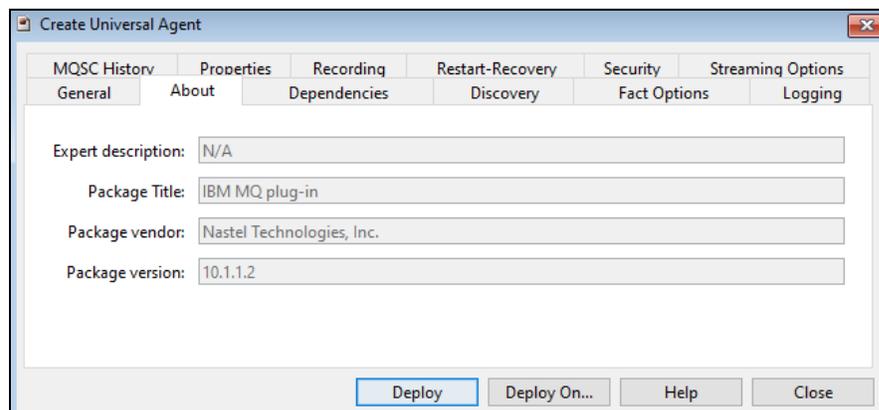


Figure 4-4. Universal Agent About Tab

5. Click the *Dependencies* tab. See [Table 4-3](#) for parameter descriptions.

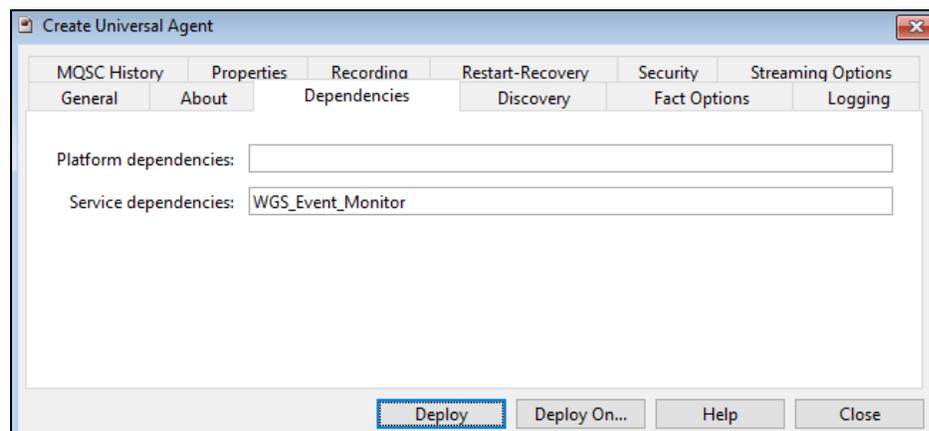


Figure 4-5. Universal Agent Dependencies Tab

6. Click the *Discovery* tab. See [Table 4-3](#) for parameter descriptions.

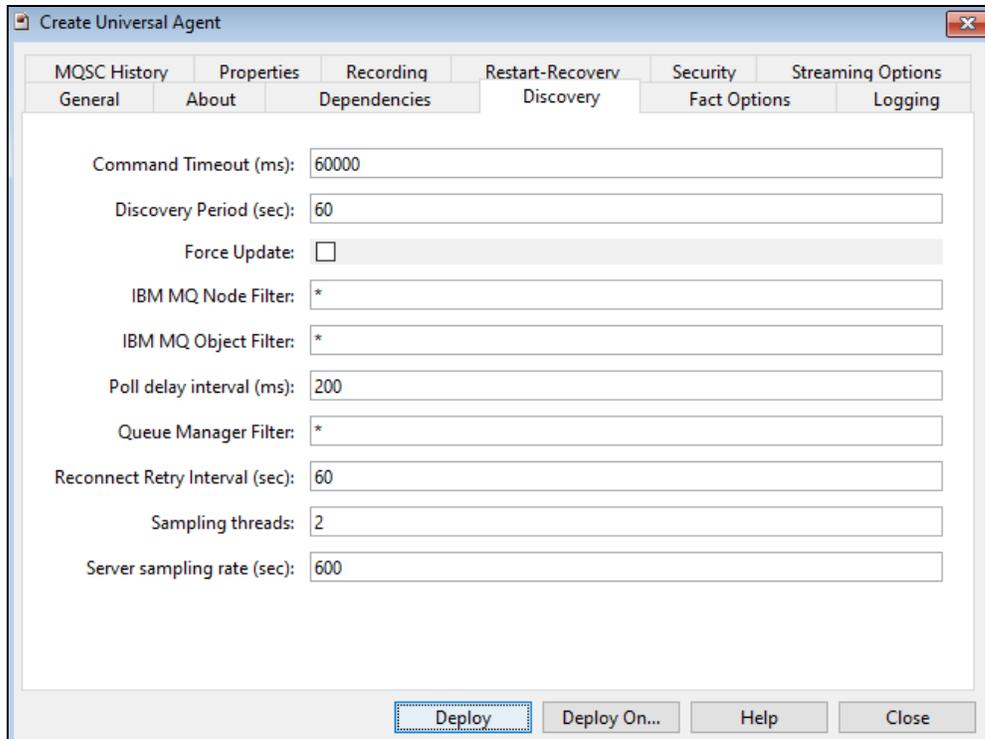


Figure 4-6. Universal Agent Discovery Tab

7. Click the *Fact Options* tab. See [Table 4-3](#) for parameter descriptions.

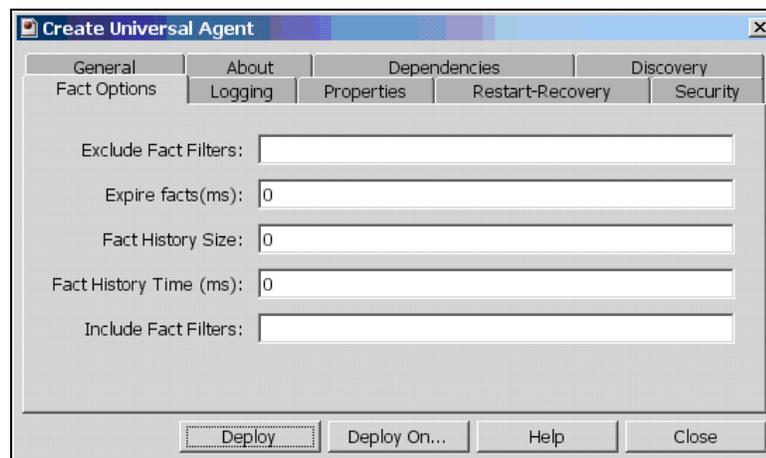


Figure 4-7. Universal Agent Fact Options Tab

8. Click the *Logging* tab. See [Table 4-3](#) for parameter descriptions.

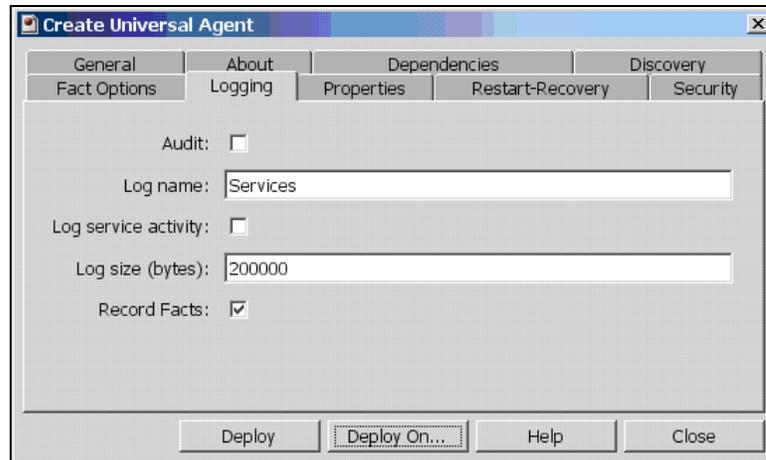


Figure 4-8. Universal Agent Logging Tab

9. Click the *Properties* tab. See [Table 4-3](#) for parameter descriptions.

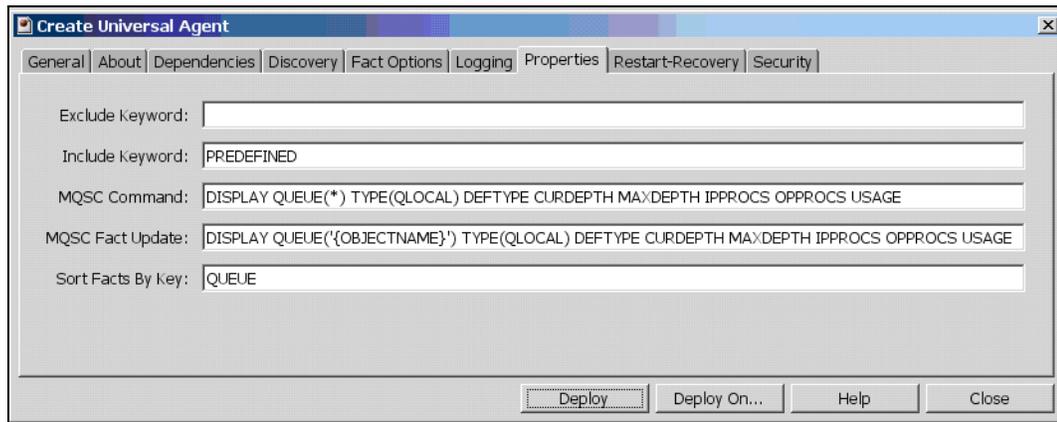


Figure 4-9. Universal Agent Properties Tab

10. Click the *Start-Recovery* tab. See [Table 4-3](#) for parameter descriptions.

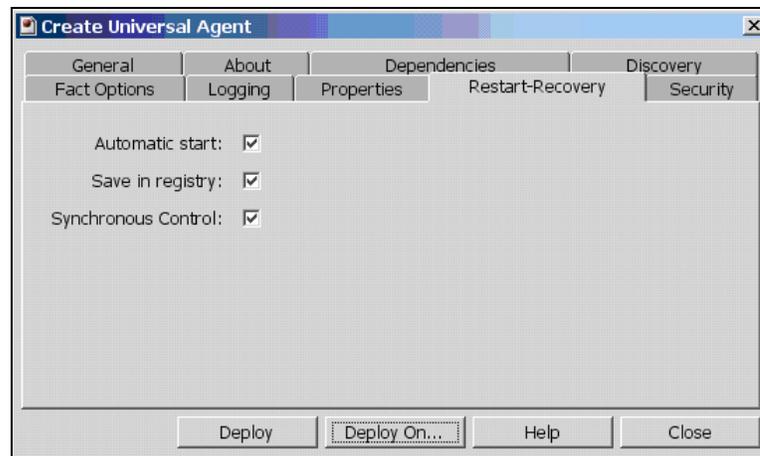


Figure 4-10. Universal Agent Restart-Recovery Tab

11. Click the *Security* tab. See [Table 4-3](#) for parameter descriptions.

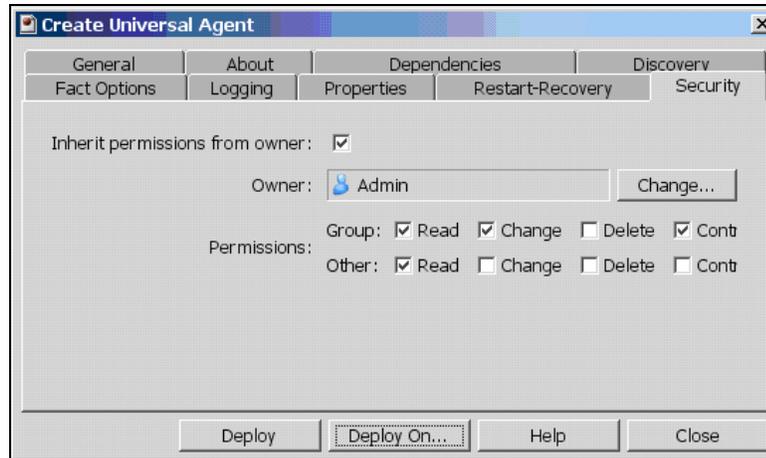


Figure 4-11. Universal Agent Security Tab

12. After all tabs have been configured, click **Deploy** to deploy the agent on the CEP server node.

OR

To deploy on multiple nodes, click **Deploy On**. Select the **Unique name** format to be used. Then select the nodes to deploy on by using **Ctrl+click** and click **Deploy**.

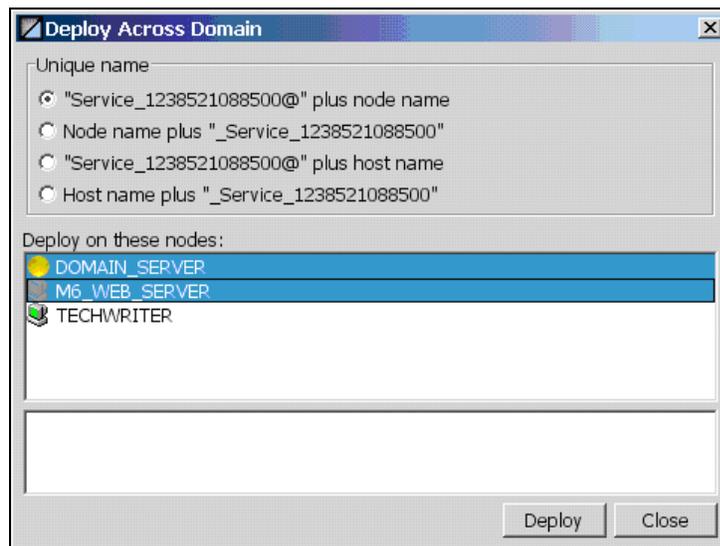


Figure 4-12. Deploy Across Domain

4.4.4 IBM MQ Non-Universal Agent Monitors

There are four non-universal agent monitors:

- Node Monitor ([section 4.4.4.1](#))
- Queue Manager Monitor ([section 4.4.4.2](#))
- Reset Queue Statistics Monitor ([section 4.4.4.3](#))
- Message Scanner Monitor ([section 4.4.4.4](#))

To deploy and configure an instance of a non-universal agent monitor:

1. Right click the desired CEP server node.
2. Select **Deploy Expert > IBM MQ > Node Monitor** (or **Queue Manager Monitor** or **Queue Statistics Monitor** or **Message Scanner**).

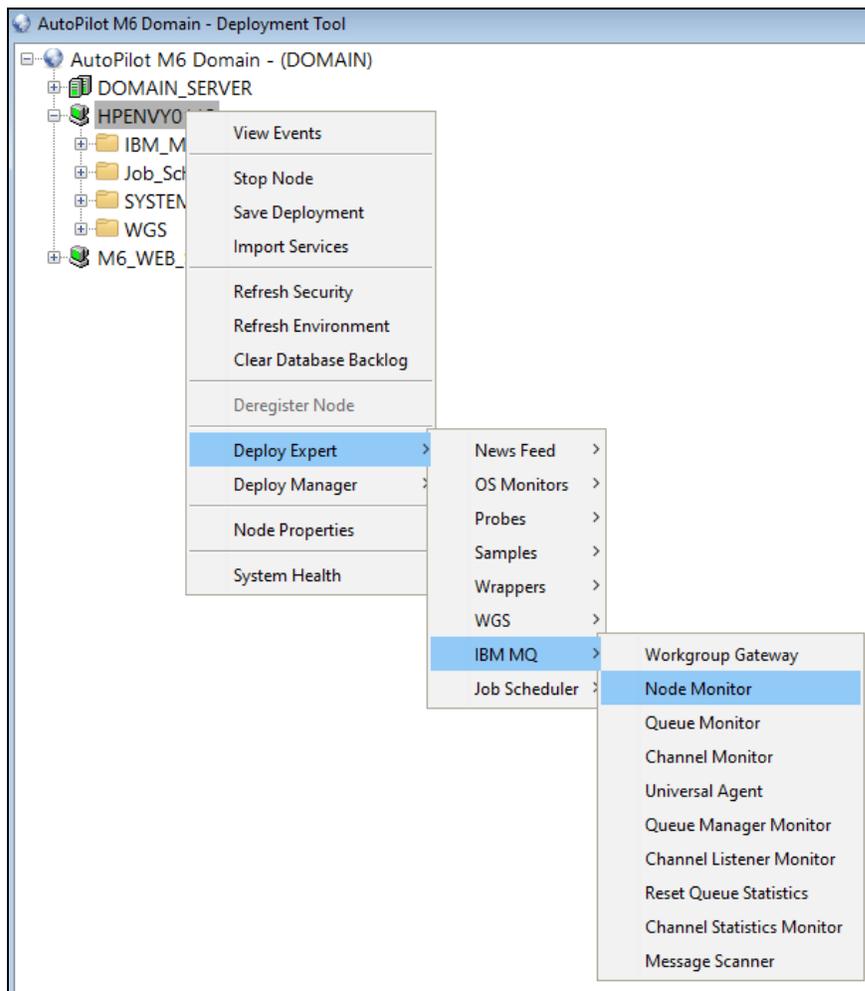


Figure 4-13. Deploying a Non-Universal Agent

3. A dialogue box is displayed (Figures 4-14 through 4-17), which allows you to configure the selected agent.
4. After all tabs have been configured, click **Deploy** to deploy the agent on the CEP server node.

OR

To deploy on multiple nodes, click **Deploy On**. Select the **Unique name** format to be used. Then select the nodes to deploy on by using **Ctrl+click** and click **Deploy**.

4.4.4.1 Node Monitor

The Node Monitor monitors M6 for IBM MQ agent availability and other metrics and publishes them as facts. The default polling time is 180 seconds. (See [Table 7-9](#), M6 for IBM MQ Node Monitor Metrics Facts.)

Requirements

- See [section 4.4.2](#), IBM MQ Event Monitor.
- An instance of IBM MQ Event Monitor defined on the same CEP server node.
- Only available in AP-IBM MQ 4.1 or higher.

Parameters

The tabs are similar to those for Universal Agents. See [section 4.4.1](#), Common Parameters, for parameters common to all IBM MQ experts.

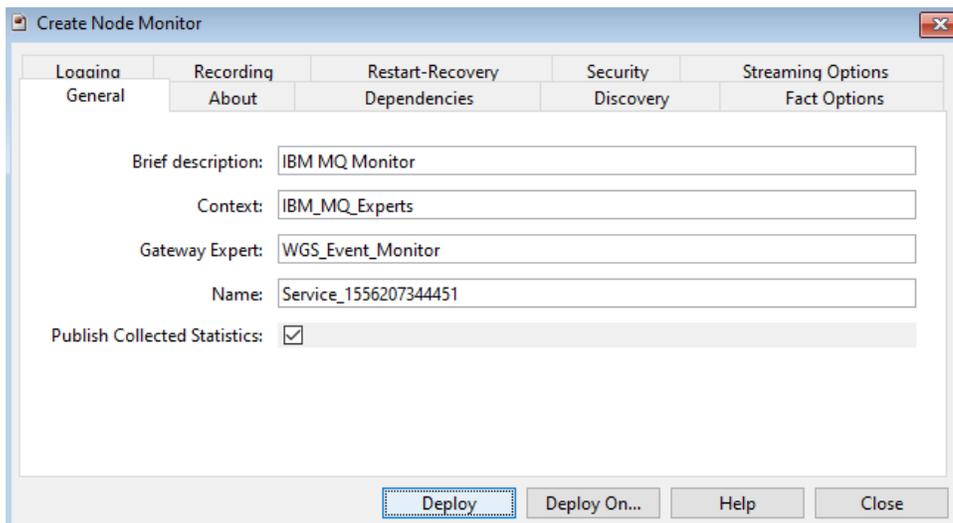


Figure 4-14. Node Monitor Dialog Box

4.4.4.2 Queue Manager Monitor

The Queue Manager Monitor (Qmgr_Monitor) collects queue manager event information and publishes them as facts. The default polling time is 180 seconds.

Requirements

- See [section 4.4.2](#), IBM MQ Event Monitor.
- An instance of IBM MQ Event Monitor defined on the same CEP server node.
- Only available in AP-IBM MQ 4.1 or higher.

Parameters

The tabs are similar to those for Universal Agents. See [section 4.4.1](#), Common Parameters, for parameters common to all IBM MQ experts.

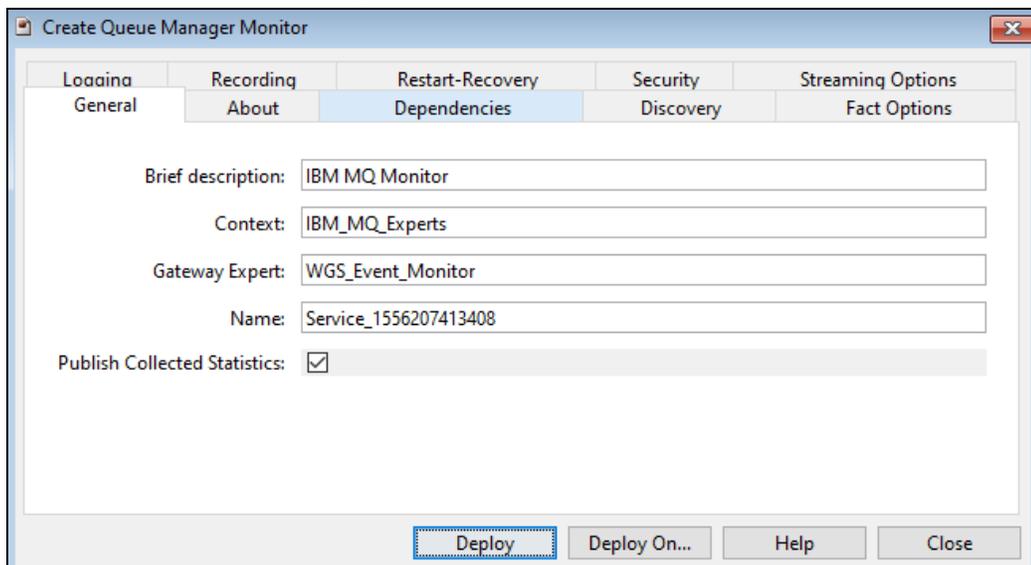


Figure 4-15. Queue Manager Monitor Dialog Box

4.4.4.3 Reset Queue Statistics Monitor

The Reset Queue Statistics Monitor (Reset_Queue_Statistics_Monitor):

- Resets queue performance information
- Publishes statistics as facts
- Records data into a flat file
- Records data into a SQL database

The Reset Queue Statistics Monitor depends on IBM MQ Event Monitor to communicate with the workgroup server. (See [Table 7-20](#), IBM MQ Reset Queue Statistics Metrics Facts.)

Requirements

See [section 4.4.2](#), IBM MQ Event Monitor.

- Instance of IBM MQ Event Monitor defined on the same CEP server node as the Queue Monitor.
- Optional: SQL database (such as Microsoft SQL Server)
- SQL table definition “queue” – table name is fixed.

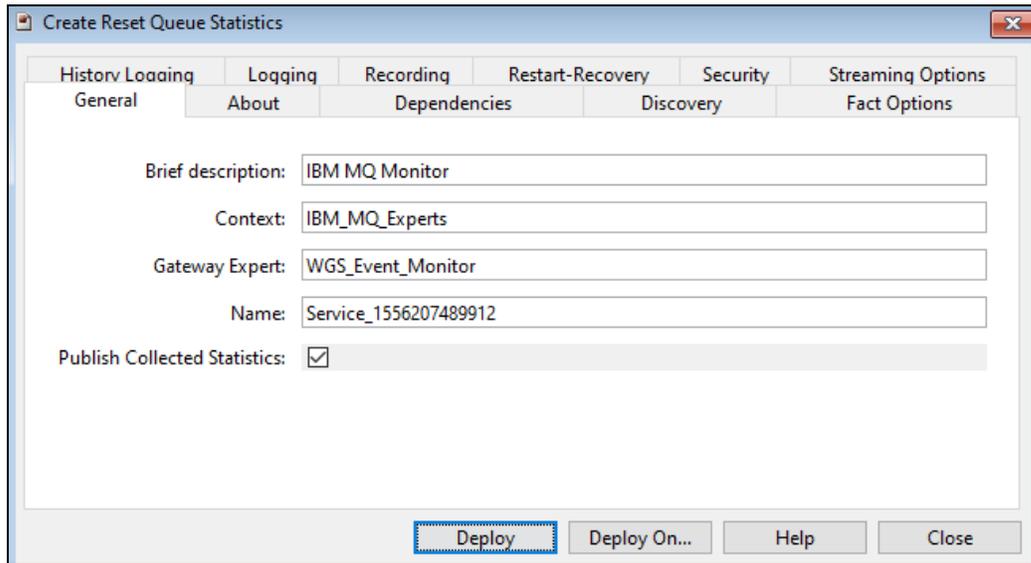


Figure 4-16. Reset Queue Statistics Monitor Dialog Box

Parameters

The tabs are similar to those for Universal Agents. See [section 4.4.1](#), Common Parameters, for parameters common to all IBM MQ experts. The parameters listed in the table below are those unique to Reset Queue Statistics.

Table 4-5. Reset Queue Statistics Parameters

Parameter	Description	Default	Recommendation
Discovery			
Exclude prefix	Exclude queues whose prefix is specified.	SYSTEM	SYSTEM queues should be excluded.
History			
Data source name (DSN)	JDBC Data Source Name.		Database specific data source name. See Database Connectivity section.
DB logon ID	Database logon id.		User name to be used to connect to the data source name.
DB password	Database password for the DB logon ID.		
File name	Name of file where historical data is recorded.	QUEUES.log	
JDBC driver	Class name of the database specific JDBC driver.		JDBC/ODBC database driver. See Database Connectivity section.
Log to database	Enable/Disable logging into SQL database.	Disabled	Enable if SQL database logging is required. Provide related database configuration.
Log to file	Enable/Disable logging into a flat file.	Enabled	Enable if file logging is required.

4.4.4.4 Message Scanner Monitor

	CAUTION!	This expert is poll based and may cause moderate CPU consumption, if the Discovery Period is very short, for example less than 30 seconds. This expert should be used only in cases when standard events reported by AutoPilot/IBM MQ are not adequate. <i>Example:</i> sampling current queue attributes at specified intervals.
---	-----------------	---

The Message Scanner Monitor (Msg_Scanner) scans queues for messages and reports information about first and last message on the queue. This Expert uses a client connection to the queue manager. Ensure that a channel listener is running and a ServerConn Channel has been defined and can accept connection requests from the Message Scanner. No Dependencies for the Message Scanner are required. (See [IBM MQ Message Performance Metrics](#).)

	NOTE:	You must define one Message Scanner for each individual queue manager whose queues you wish to monitor.
---	--------------	---

Requirements

- See [section 4.4.2](#), IBM MQ Event Monitor.
- Instance of IBM MQ Event Monitor defined on the same CEP server node.

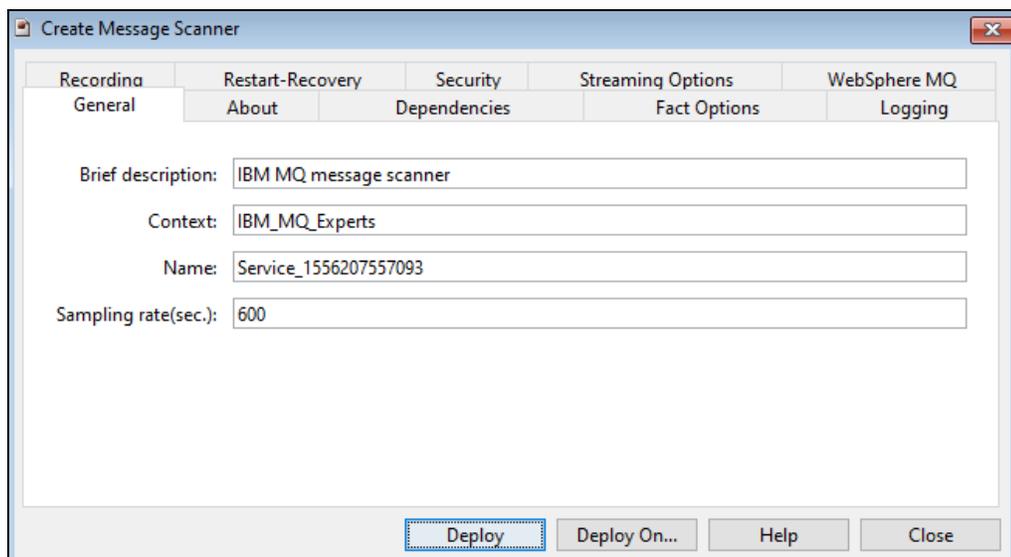


Figure 4-17. Message Scanner Dialog Box

Parameters

The tabs are similar to those for Universal Agents. See [section 4.4.1](#), Common Parameters, for parameters common to all IBM MQ experts. The parameters listed in the table below are those unique to the Msg_Scanner.

Table 4-6. Message Scanner Parameters

Parameter	Description	Default
General		
Sampling rate(sec)	Time interval in seconds for sampling message data and reporting to facts board.	600
IBM MQ		
Max scan depth	Maximum scan depth limit (0 unlimited).	100
Password	Password to be used when connecting to the queue manager.	
Queue manager host	Name of host where queue manager is defined.	Localhost
Queue manager name	Name of local queue manager.	YOUR-QMGR
Queue manager port	Channel listener TCP port for queue manager.	5010
Queue name list	Comma separated list of queue names to scan. Wildcard (*) is supported.	SYSTEM.ADMIN.COMMAND.QUEUE
Search string message limit	<p>The max amount of message text that will be searched:</p> <ul style="list-style-type: none"> • If left at 0 the message limit will be increased to 1000 bytes when a message text is provided • Just as with other metrics, a fact tree will be added "FirstMatch" when a matching record is found. Only the first message will be reported as a message. <p>Note that binary messages may be searched but results will vary depending on message content</p>	
Search string text	The case sensitive text to search	
Search type	<p>Can be used to control what happens when searching.</p> <ul style="list-style-type: none"> • First: the messages are searched until one match is found, scanning for other attributes continues. • All: all messages are searched, the first is reported and the total found count is reported in summary • Stop: the messages are searched until one match is found, then stops, scanning for other attributes is not done 	
Server connection channel	Name of server connection channel on queue manager.	SYSTEM.ADMIN.SVRCONN
User ID	User ID to be used when connecting to the queue manager.	

4.4.5 Integrating the AutoPilot M6 MQSpeedtest Utility

MQSpeedtest can be integrated with AutoPilot as a process wrapper expert. For more information, please see [AutoPilot MQSpeedtest for IBM MQ Quick Start Guide](#).

Chapter 5: Business Views

IBM MQ plug-in comes with several business views that can be user customized. All default business views are located in directory:

[*AUTOPILOT_HOME*]\naming\policies\WebSphere_MQ

Table 5-1. Default Business Views		
Business View	Filename for WGS 10 (for WGS 6, prefix is WMQ versus MQE2)	Description
APMW_Infrastructure_Health	MQE2_Infrastructure_Health.bsv	Generic business view that monitors all aspects of M6 for IBM MQ and the management infrastructure.
APMW_License	MQE2_License.bsv	License to use AP M6 features, including: {Kerberos, SQLDB, TopologyView}, on which hosts, max CPU count, max user count, agentless connections, max Navigator users, max z/OS MIPS, workgroup name, expiration date.
MQ_Channels	MQE2_Channels.bsv	Monitors for failed or indoubt channels.
MQ_Clusters	MQE2_Clusters.bsv	Monitors IBM MQ cluster status including SYSTEM.CLUSTER queues, and queue managers in the cluster.
MQ_DLQs	MQE2_Dlqs.bsv	Monitors all dead letter queues and alerts if message arrives on the dead letter queue.
MQ_Events	MQE2_Events.bsv	Monitors IBM MQ faults for channels, queues and queue managers.
MQ_Health_Policy	MQE2_Health_Policy.bsv	Monitors overall IBM MQ health and events from IBM MQ Event Monitor.
MQ_Qmgrs	MQE2_Qmgrs.bsv	Monitors queue manager status as well as key attributes such as activity, undefined dlqs, auto and remote channels and queue monitor event subscription.
MQ_Queues	MQE2_Queues.bsv	Monitors all local and transmission queues that have problems.
MQ_Status	MQE2_Status.bsv	Monitors status of queue manager, system service, clusters, channels, queues, and dead letter queues.
MQ_System_Services	MQE2_System_Services.bsv	Monitors all IBM MQ system services (such as a queue manager command server and listener) that are required for IBM MQ to perform properly

These business views are parameterized using business view environment variables. All environment variables are defined at the top most sensors.

5.1 Management Infrastructure Status

Management Infrastructure Status business view monitors the health of the AutoPilot M6 for IBM MQ management network that includes workgroup servers and M6 for IBM MQ Agents.

Below is a sample of a running Management Infrastructure Status Monitor business view.

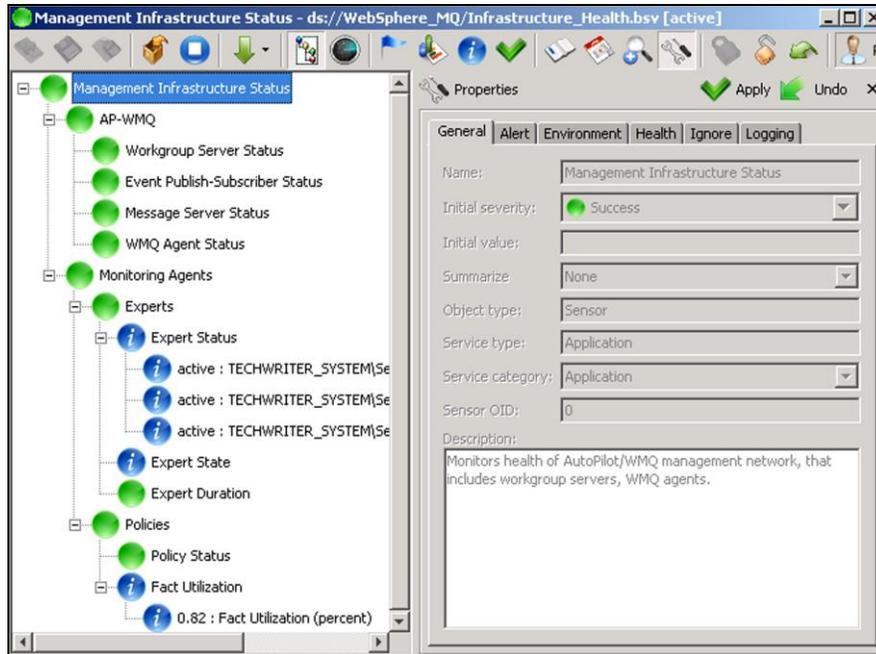


Figure 5-1. Sample Management Infrastructure Status Monitor Business View

5.2 IBM MQ Channels Health

IBM MQ Channels Health business view monitors MQ channels for failed or indoubt channels. Indoubt Channels sensor is enabled if a channel is in an indoubt state.

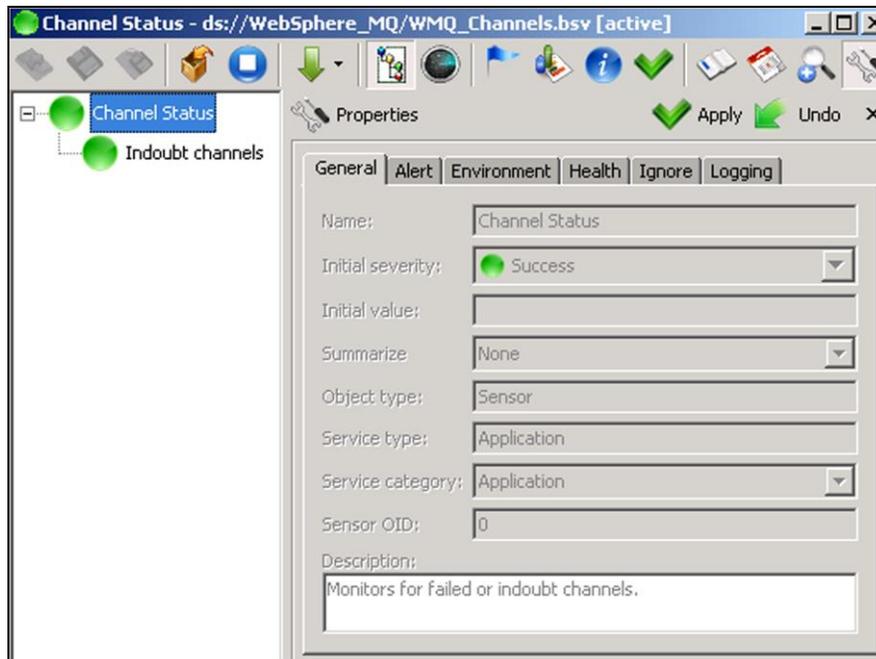


Figure 5-2. Sample Channel Status Business View for WGS 6 Policy Manager

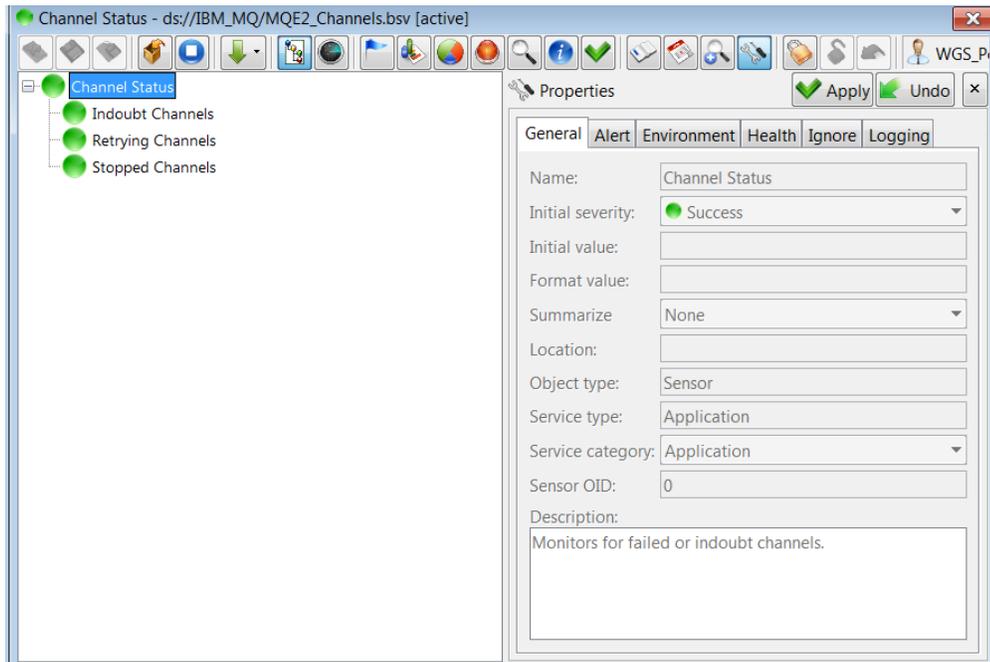


Figure 5-2a. Sample Channel Status Business View for WGS 10 Policy Manager

5.3 IBM MQ Cluster Health

IBM MQ Cluster Health business view monitors MQ cluster environment status as follows:

- Monitors queue managers in the cluster.
- Monitors key queues for cluster operation including: SYSTEM.CLUSTER.COMMAND.QUEUE, SYSTEM.CLUSTER.TRANSMIT.QUEUE and SYSTEM.CLUSTER.REPOSITORY.QUEUE
- Monitors cluster channels (receiver and sending)

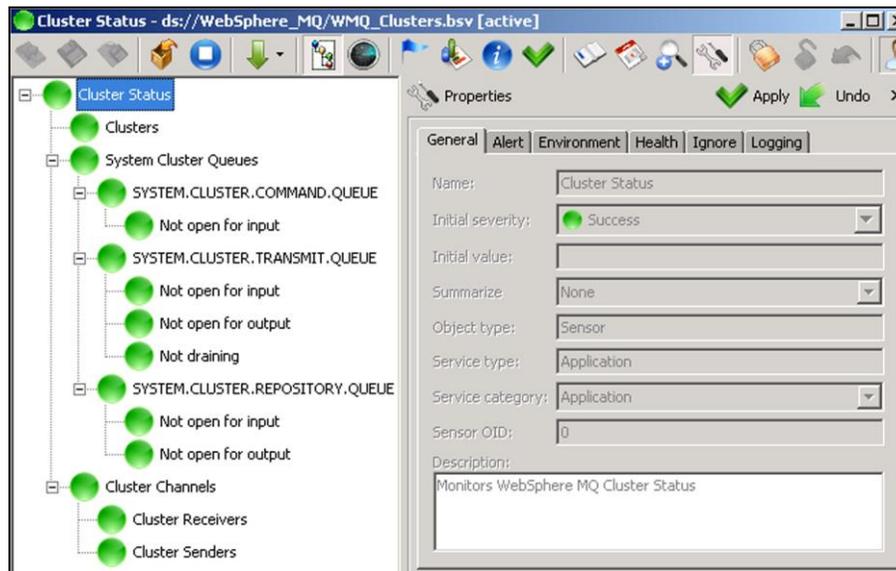


Figure 5-3. Sample Cluster Status Business View for WGS 6

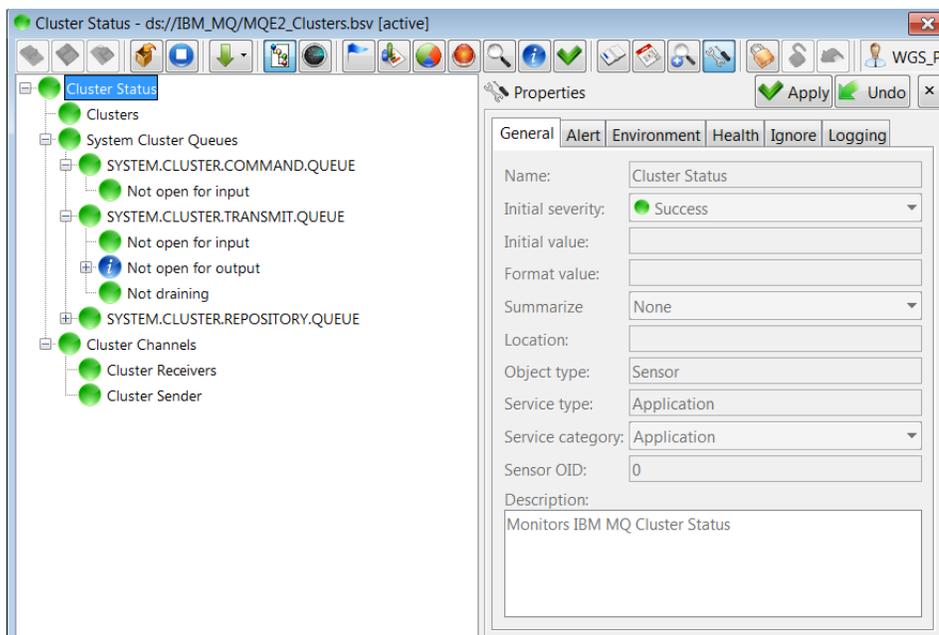


Figure 5-3a. Sample Cluster Status Business View for WGS 10 Policy Manager

5.4 IBM MQ Dead Letter Queues (DLQs)

IBM MQ DLQs business view monitors all messages filling up in DLQs and alerts when message arrives on the DLQ. The sensor will turn red when queue depth is greater than 50. The sensor will turn green when queue depth is zero and then disappear after 30 seconds.

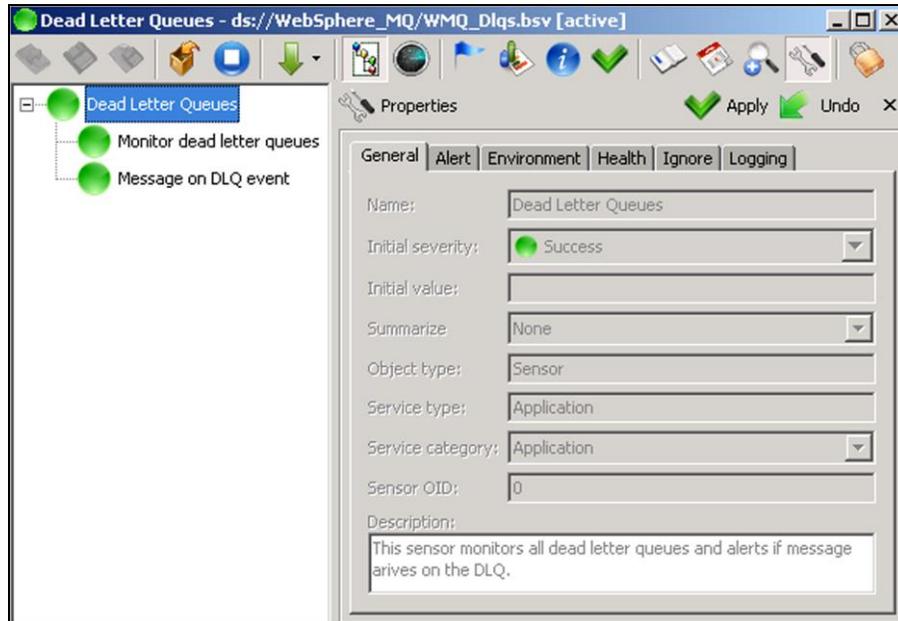


Figure 5-4. Sample Dead Letter Queues Business View

5.5 IBM MQ Events

IBM MQ Events business view monitors IBM MQ faults for channels, queues and queue managers. Some examples include:

- Channel instance is stopped
- Queue depth limit has been reached.
- Application tries to put a message to a queue that does not exist.

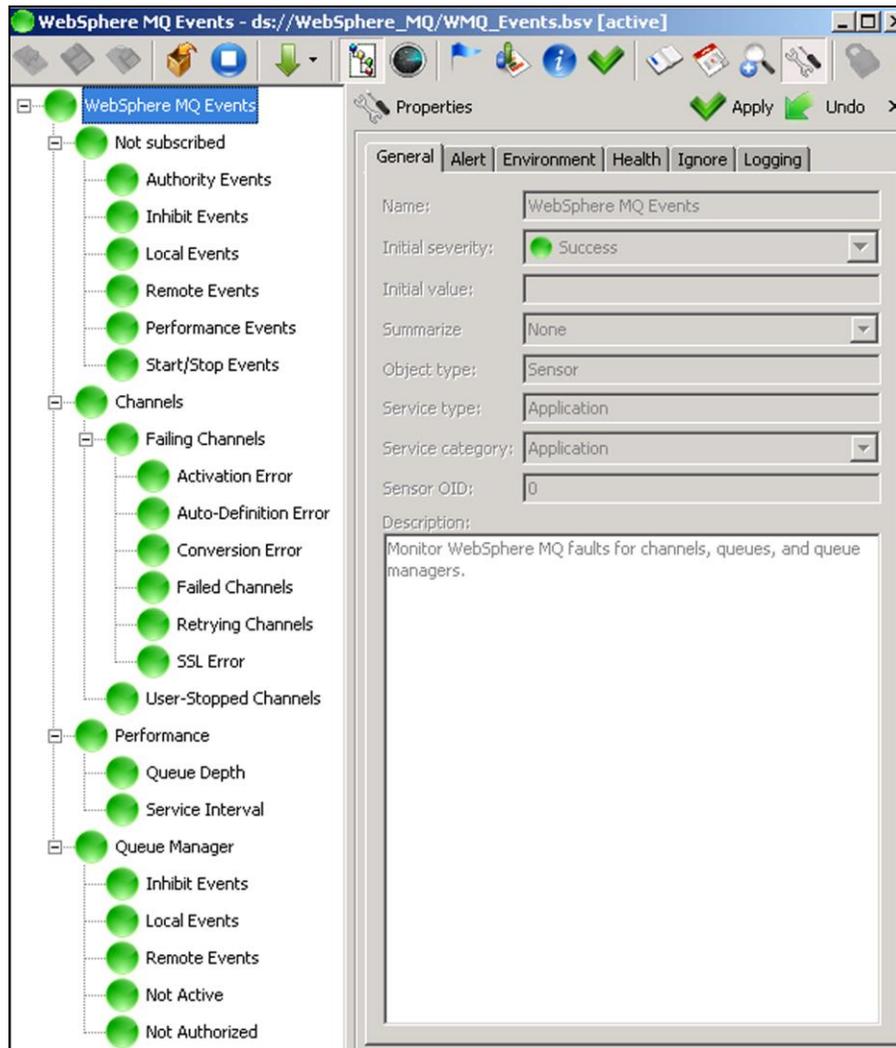


Figure 5-5. Sample IBM MQ Events Business View

5.6 IBM MQ Health

IBM MQ Health business view monitors the overall health of the IBM MQ Network. Only exceptions are shown. Upon correction of the problems, some sensors will disappear, while others may display an  icon. This occurs when a particular fact is unavailable. If a fact is not required, it can be acknowledged by clicking the **Acknowledgement** button on the menu (right-clicking on the sensor) for the fact in question. The  icons indicate that these sensors are links to other business views. To access the target link, right-click the linked sensor and click **Open Target Link**.

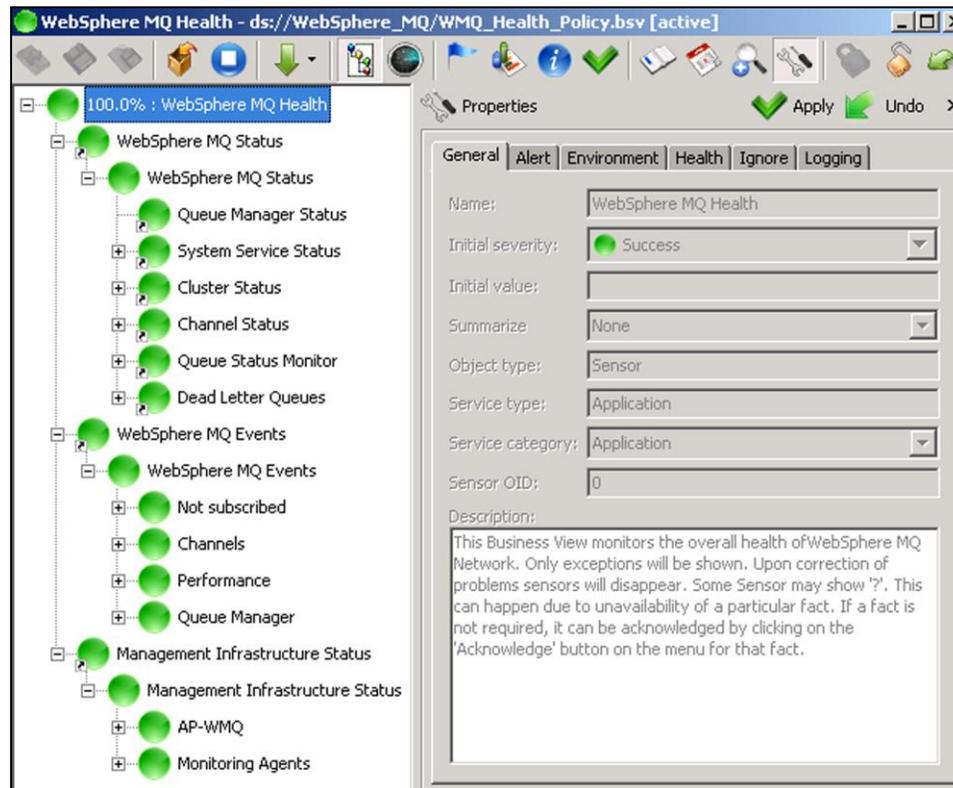


Figure 5-6. Sample IBM MQ Health Business View

5.7 IBM MQ Queue Manager

IBM MQ Queue Manager Status business view monitors queue manager status and events as well as key attributes. Also monitors queue managers that are not subscribed for certain types of events.

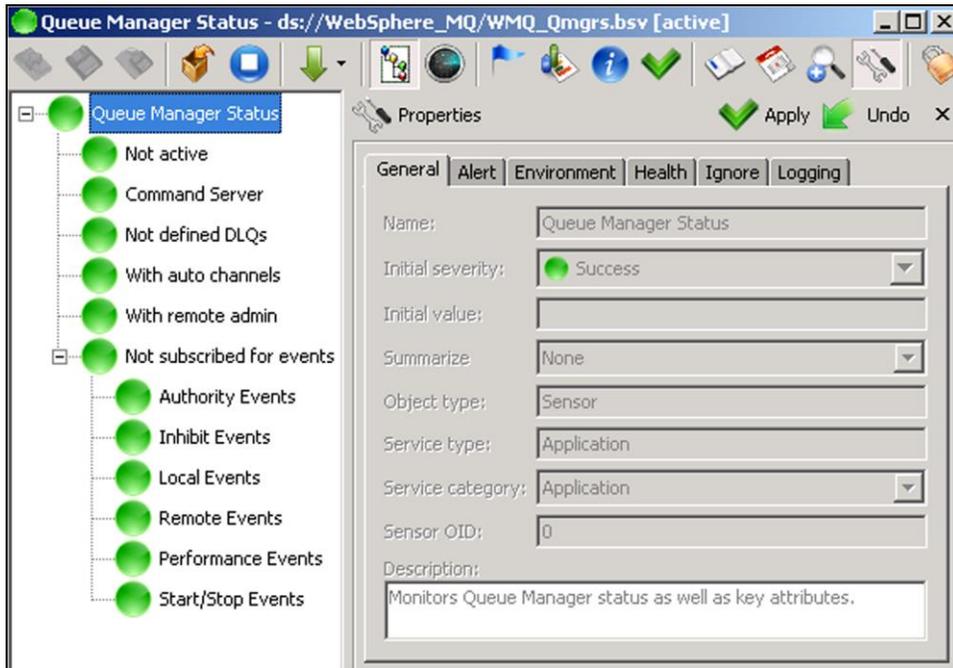


Figure 5-7. Sample Queue Manager Status Business View

5.8 IBM MQ Queues

IBM MQ Queue Status Monitor business view monitors all local and transmission queues that are having problems. The Queue Status Monitor can be modified or enhanced based on specific customer requirements.

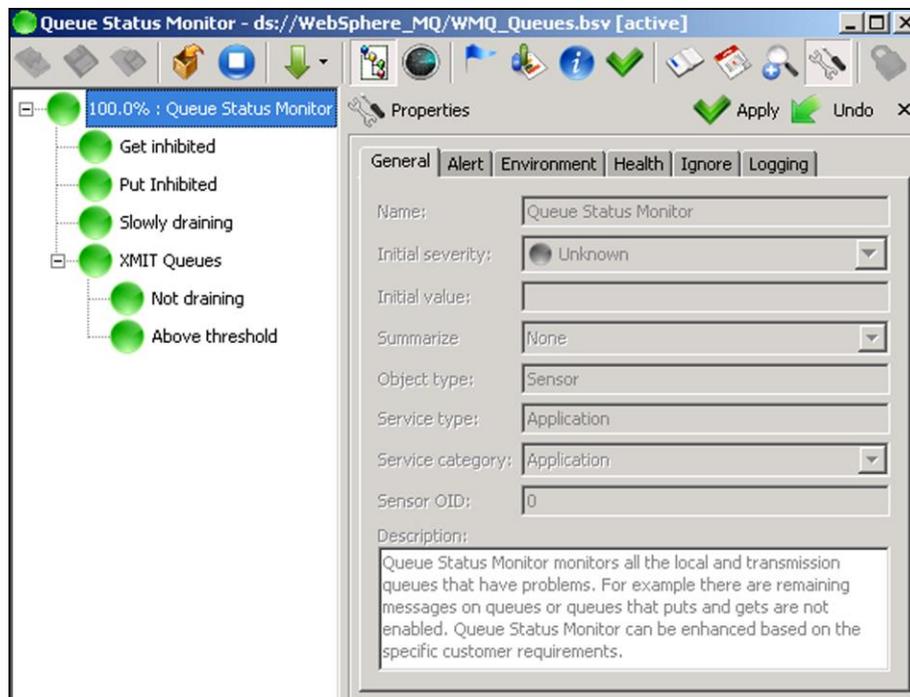


Figure 5-8. Sample Queue Status Monitor Business View

5.9 IBM MQ Status

IBM MQ Status business view monitors IBM MQ status of the following:

- Queue Managers
- System Services
- Clusters
- Channels
- Queues
- Dead Letter Queues

The  icons indicate that these sensors are links to other business views. To access the target link, right-click the linked sensor and click **Open Target Link**.

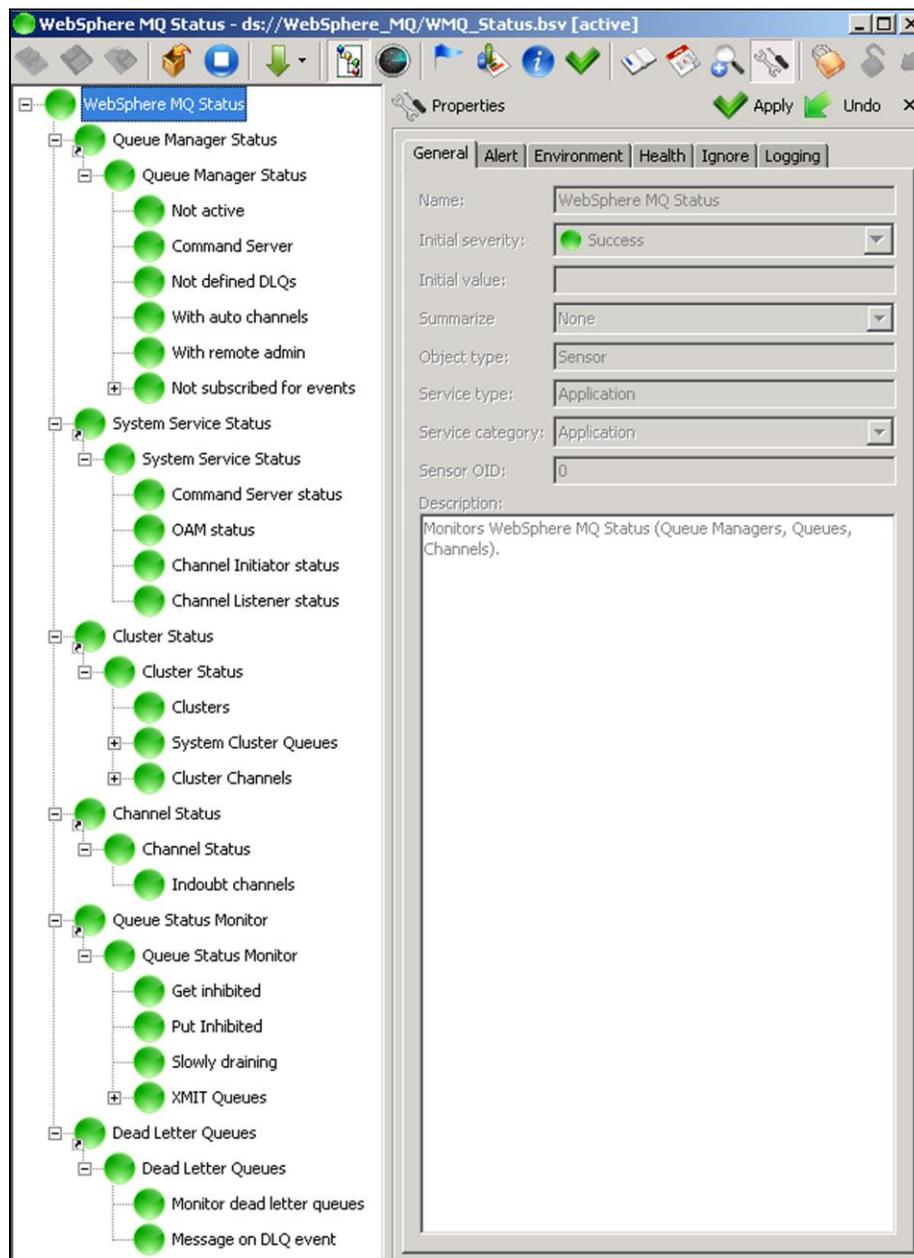


Figure 5-9. Sample IBM MQ Status Business View

5.10 IBM MQ System Services

IBM MQ System Service Status business view monitors all system services that are required for IBM MQ queue managers to run properly. This includes:

- Command Server status
- Object Authority Manager (OAM) status
- Channel Initiator status
- Channel Listener status.

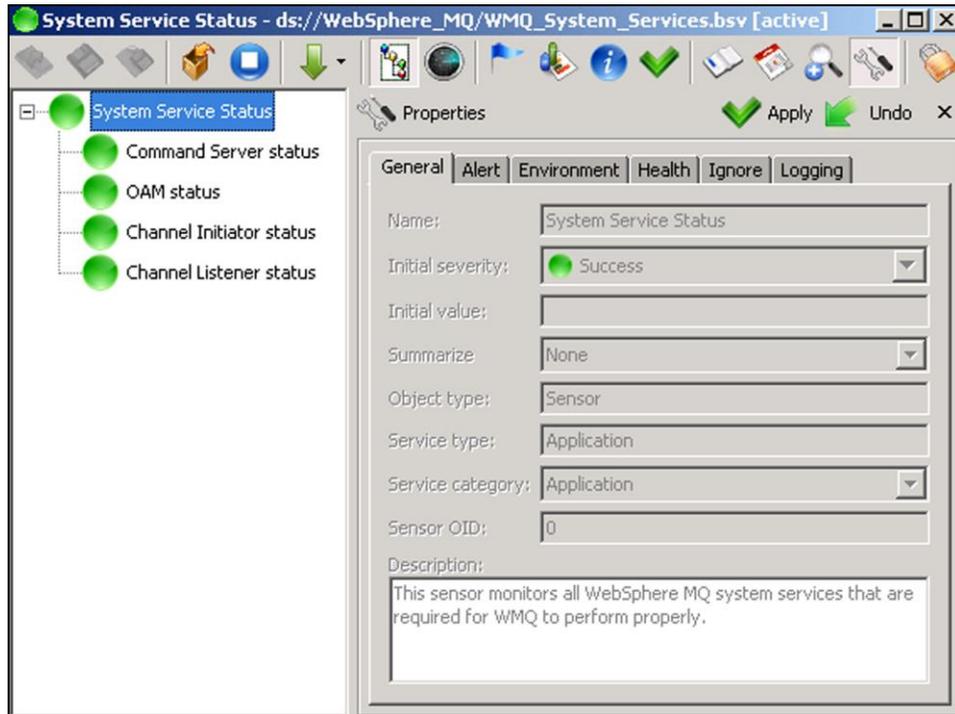


Figure 5-10. Sample System Service Status Business View

Chapter 6: Performance Tuning

Workgroup servers and CEP server nodes will use progressively higher CPU/memory with the increase of AutoPilot M6 polling experts such as Queue Monitors, Channel Monitors, Queue Manager Monitor, and Node Monitors.

The number of active experts at any given moment must be kept to a minimum to reduce CPU usage. Reduce or limit CPU usage as follows:

1. Use event-based monitoring using M6 for IBM MQ Event Monitor (WGS Event Monitor).
2. Use fewer experts with smaller discovery scope.
3. Eliminate channel monitors since channel events can be used to determine channel status.
4. Increase discovery interval for each expert
5. Use Scheduling Policy to schedule several services one after the other. This will load balance the experts and their use of CPU and other system resources.

	NOTE:	The more polling experts there are, and the smaller the discovery interval, the more CPU usage it will take from AutoPilot and workgroup server. Use polling experts only when absolutely necessary.
---	--------------	--

Below are some performance tuning suggestions:

Table 6-1. Performance Tuning Suggestions	
Property	Suggestion
IBM MQ Control Performance Tuning	
Update Interval:	600 or more (workgroup server properties).
Node Discovery:	Interval is less than Update Interval. Should be 2/3 of the Update Interval. (Node properties)
Command Limit:	Should be number of objects on the Queue Managers + 1/3 of that number. (Node properties)
Command Timeout:	Should be within 60-120 seconds, depending on speed/load of the slowest IBM MQ server machine. The slower the machine the higher the timeout value should be. (Node properties)
IBM MQ Plug-in Performance Tuning	
Discovery Period:	120 seconds for up to 1000 objects, 300 for up to 5000 objects, 500+ seconds for 5000+ objects.
Group Connection Pool:	Should not be greater than maximum number of licensed group manager connections. It also should allow room for other client connections such as workgroup server applications.

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Chapter 7: IBM MQ Metrics

This section describes all IBM MQ metrics collected by IBM MQ monitors using WGS 6.x. They are published as facts and are available under each expert as shown below:

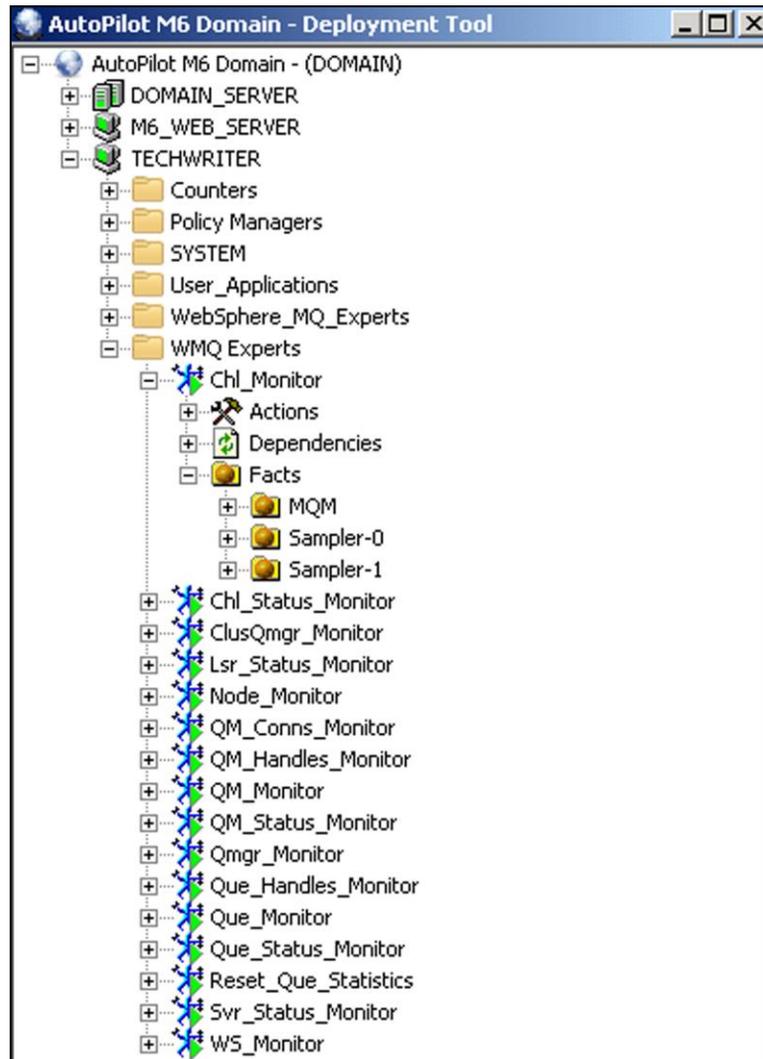


Figure 7-1. IBM MQ Metrics Collected by IBM MQ Monitors

Once published, these facts can be included in one or more business views for validation, automation, notifications, logging and alerts.

All IBM MQ plug-in monitors publish facts that follow the structure below:

Facts\group_name\node_name\qmgr_name\object\parameter

7.1 M6 for IBM MQ Event Monitor Metrics

Table 7-1. M6 for IBM MQ Event Monitor Metrics Facts

Parameter	Type	Values	Description
Pool_Enabled	Boolean	True/false	Whether event monitor's connection pool is enabled. The poll must be enabled in order for other monitors to work. The connection pool is enabled automatically when the event monitor starts.
Pool_Max_Size	Integer	≥ 0	Maximum size of the workgroup server connection pool. See IBM MQ Event Monitor requirements.
Pool_Usage	Integer	≥ 0 and <Pool_Max_Size>	Actual connection pool usage by all monitors that are configured for the event monitor.
Pool_Waiting	Boolean	True/false	Shows whether there are monitors waiting for a connection to free up. This usually means that there are more active monitors then there are available pool connections.
ws_connection	Boolean	True/false	Whether the event monitor is connected to the workgroup server.
ws_events	Boolean	True/false	Whether the event monitor is running.
ws_reason	Integer	≥ 0	M6 for IBM MQ or IBM MQ event reason code.
ws_stats	Boolean	True/false	Whether the workgroup server statistics are available.

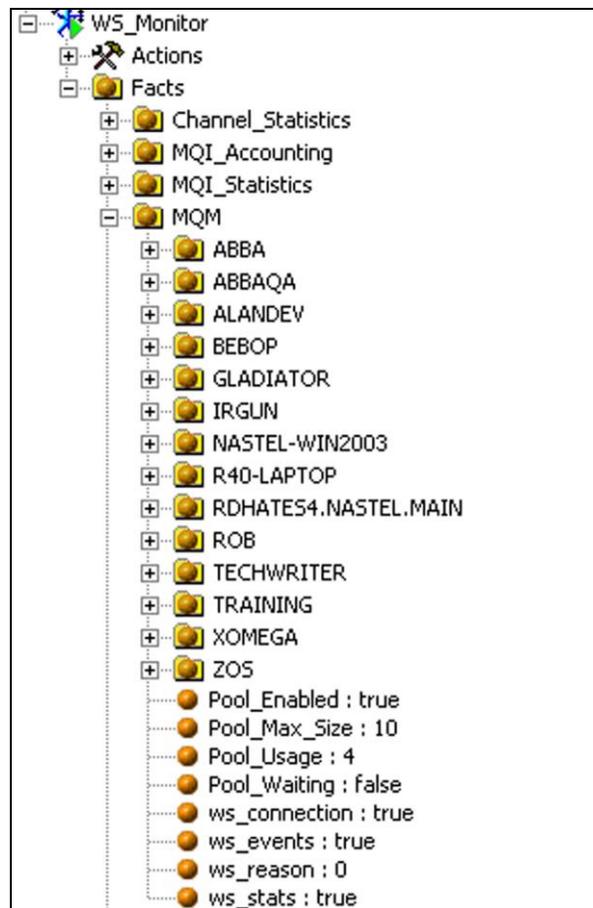


Figure 7-2. Event Monitor Metrics

7.1.1 IBM MQ Queue Manager Events

Below is a structure of queue manager events:

```
Facts\<<group_name>\<node_name>\<qmgr_name>\<Parameters>
<group_name> -- Workgroup server name
<node_name> -- M6 for IBM MQ node name
<qmgr_name> -- Queue manager name
```

Table 7-2. IBM MQ Queue Manager Events Facts

Parameter	Type	Values	Description
BaseQName	Integer	≥ 0	Name of the queue that the alias resolves to. This attribute is read-only.
EventNo	Integer	≥ 0	Workgroup server event number as recorded in group history.
GroupName	String		Workgroup server name.
MQNodeName	String		Name of M6 for IBM MQ node where event occurred.
MQNodeNetAdd	String		IP address of M6 for IBM MQ node where event occurred.
ObjectName	String		Name of object on which event occurred.
ObjectType	String	Workgroup server, MQNode, QMgr, Queue, Channel, Process, Client Connection, Namelist, Listener, Service, Cluster QMgr, Authentication Information	Event type of object.
QmgrName	String		Name of Queue Manager where event occurred.
QName	String		Name of Queue where event occurred.
ReasonId	Integer	≥ 0	M6 for IBM MQ or IBM MQ event reason code.
ReasonQual	Integer	≥ 0	Explains, in more detail, the ReasonId.
State	String	Active, Inactive, Stopping, Stopped, etc.	Object specific state reported by the event.
UserId	String		Name of the user that generated the event.

Below is an example of a queue manager event:

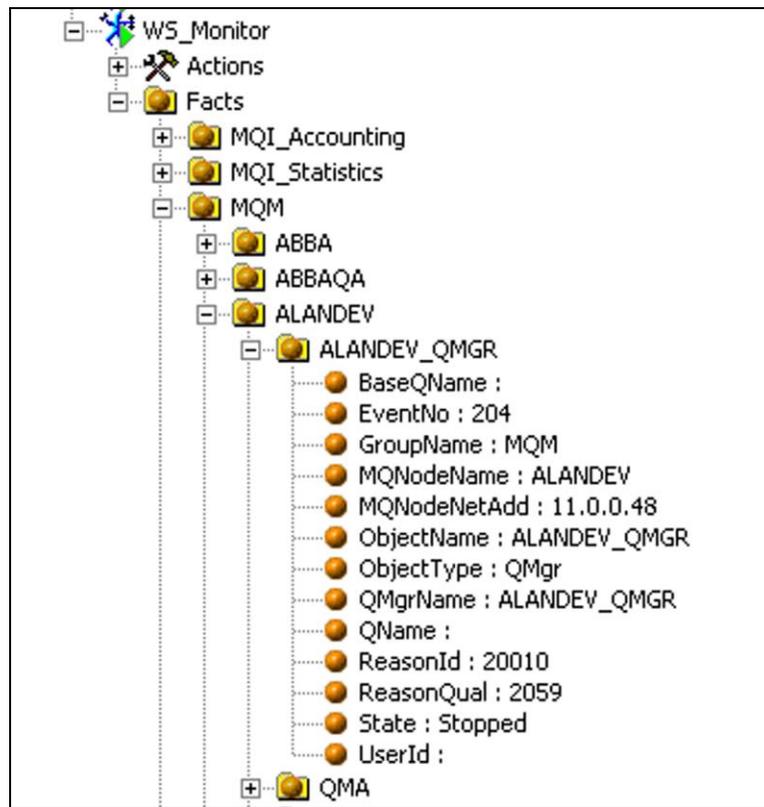


Figure 7-3. Sample Queue Manager Event

7.1.2 IBM MQ Queue and Channel Events

Below is a structure of queue and channel events:

```
Facts\<<group_name>\<node_name>\<qmgr_name>\<queue>or<channel>
\<<parameter>
<group_name> -- Workgroup server name
<node_name> -- M6 for IBM MQ node name
<qmgr_name> -- Queue manager name
<queue> -- IBM MQ queue name
<channel> -- IBM MQ channel name
```

Table 7-3. IBM MQ Queue and Channel Events Facts

Parameter	Type	Values	Description
EventNo	Integer	≥ 0	Workgroup server event number as recorded in the group history.
GroupName	String		Workgroup server name.
MQNodeName	String		Name of M6 for IBM MQ node where event occurred.
MQNodeNetAdd	String		IP address of the M6 for IBM MQ node where the event occurred.
ObjectName	String		Name of the object on which the event occurred.
ObjectType	String		Event type of object. <i>Only available for channels.</i>
QMgrName	String		Name of the queue manager where the event occurred.
Qname	String		Name of queue where the event occurred. <i>Only available for queues.</i>
ReasonId	Integer	≥ 0	M6 for IBM MQ or IBM MQ event reason code.
ReasonQual	Integer	≥ 0	Queue event reason qualifier. <i>Only available for queues.</i>
UserId	String		Name of user that generated the event.

Below is an example of queue and channel events:

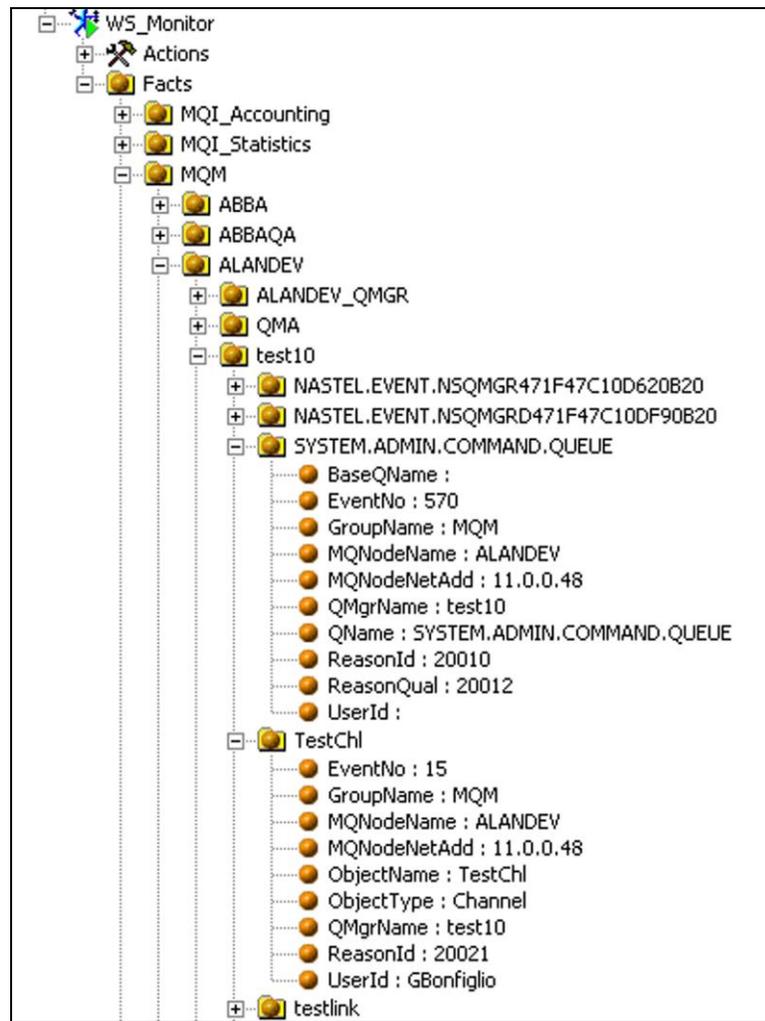


Figure 7-4. Sample Queue and Channel Events

7.2 Universal Agent Monitor Sampler Metrics

For optimum performance, CEP server nodes for Universal Agent monitors are divided into groups called *samplers* that run in parallel with each other. The number of samplers is based on the number of MQ managed nodes.

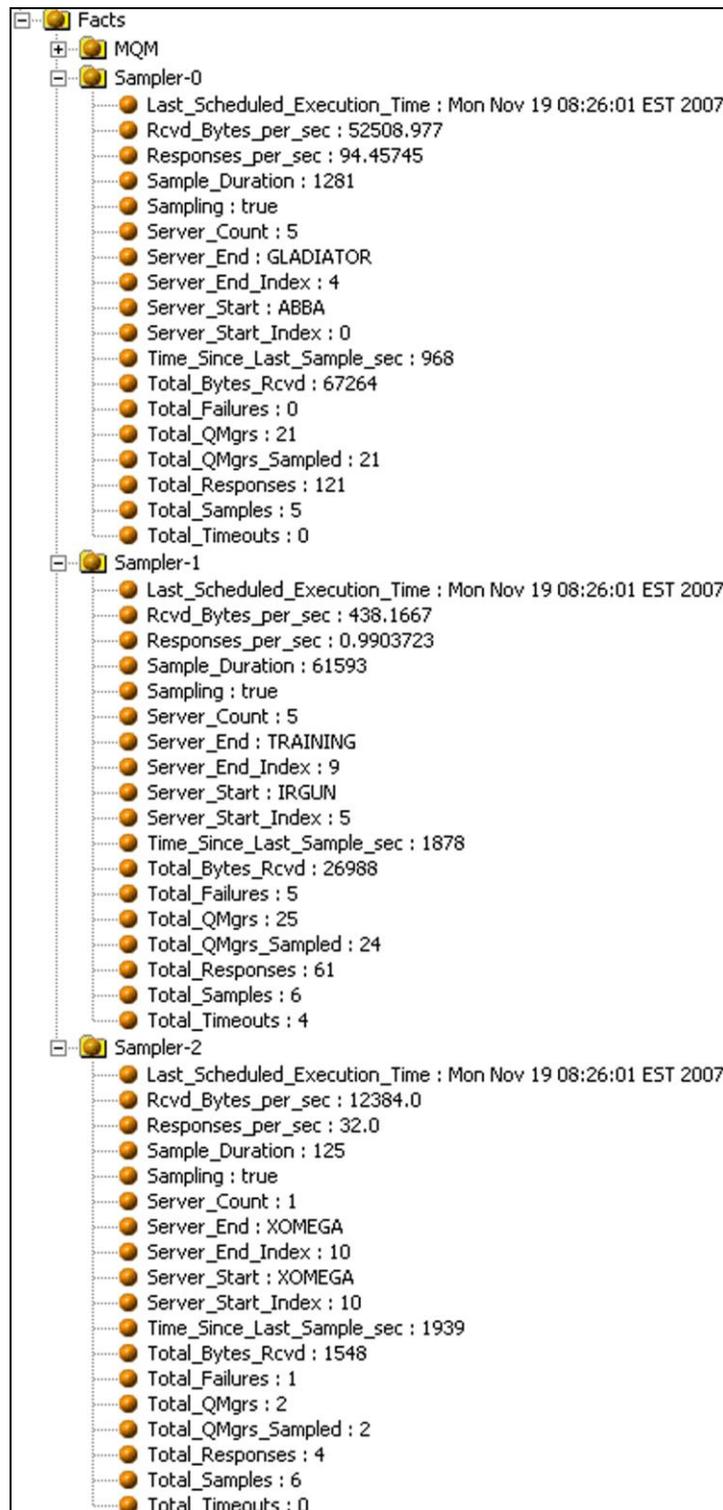


Figure 7-5. Typical Sampler Metrics

In the example above, MQM has 11 MQ managed nodes (servers). Sampler 0 contains five servers, starting with MQ managed node ABBA and ending with GLADIATOR. Sampler 1 starts with IRGUN, ends with TRAINING and also has 5 servers. Sampler 2 has 1 server, XOMEGA.

7.2.1 IBM MQ UA Channel Monitor Metrics

Facts

Table 7-4. IBM MQ UA Channel Monitor Metrics Facts			
Parameter	Type	Values	Description
CHANNEL	String		Name of channel.
CHLTYPE	String	Sender, Receiver, Requester, SrvConn, Server, ClntConn, ClusterReceiver, ClusterDriver, ClusterSender	Type of Channel.
CONNNAME	String		Connection name – not available for Receiver and SvrConn channels.
LOCLADDR	String		Local address - not available for Receiver and SvrConn channels.

Actions

Table 7-5. IBM MQ UA Channel Monitor Metrics Actions	
Action	Description
Stop-Channel	Stops the associated channel.
Start-Channel	Starts associated channel.
Commit-Channel	Resolve with commit.
Backout-Channel	Resolve with back out.
Reset-Channel	Reset channel message sequence number (MSN).

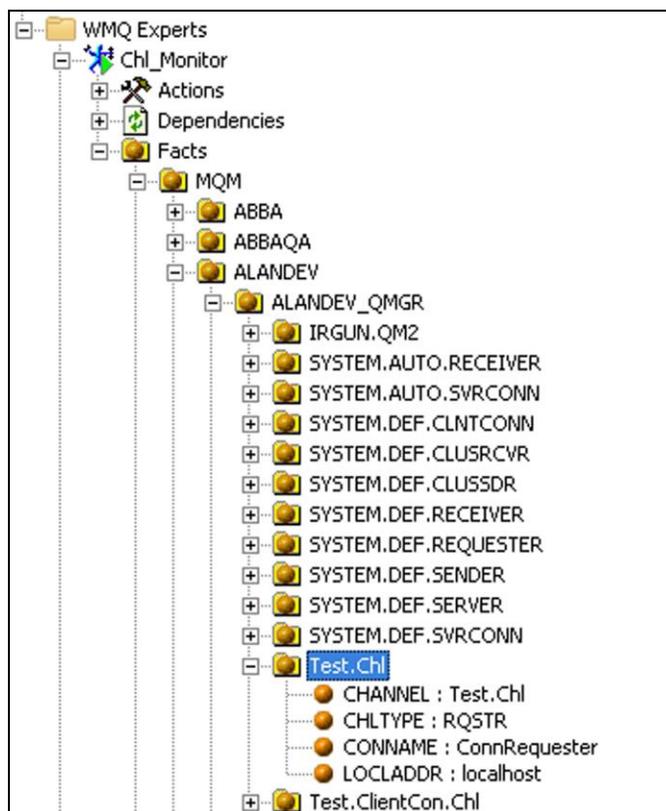


Figure 7-6. Sample UA Channel Monitor Metrics

7.2.2 IBM MQ UA Channel Status Monitor Metrics

Table 7-6. IBM MQ UA Channel Status Monitor Metrics Facts			
Parameter	Type	Values	Description
BYTSRCVD	Integer	≥ 0	Bytes received since last start.
BYTSENT	Integer	≥ 0	Bytes sent since last start.
CHANNEL	String		Name of channel.
CHLTYPE	String	Sender, Receiver, Requester, SrvConn, Server, ClntConn, ClusterReceiver, ClusterDriver, Cluster Sender	Channel type.
CONNAME	String	Specify the fully qualified DNS name or IP address of the host together with an optional port number. Maximum string length is 264 characters.	Connection name – not available for Receiver and SvrConn channels. The DNS name or IP address of the host on which the LDAP server is running, together with an optional port number.
CURMSGs	Integer	≥ 0	Number of current messages.
CURSEQNO	Integer	≥ 0	Current message sequence number.
INDOUBT	String	Yes, No	Displays if Channel is in an indoubt state.
JOBNAME	String	For example: (0000013400000A28)	Name of job currently serving the channel. This information is not available on z/OS. The parameter is ignored if specified.
MSGs	Integer	≥ 0	Number of messages sent/received.
RQMNAME	String		Remote queue manager name.
STATUS	String	Running, Inactive, Stopped, Retrying, Suspended, Binding, Starting, Paused, Initializing	Current channel state.
SUBSTATE	String		Action being performed by the channel when this command is issued.
XMITQ	String		Name of transmitting queue.

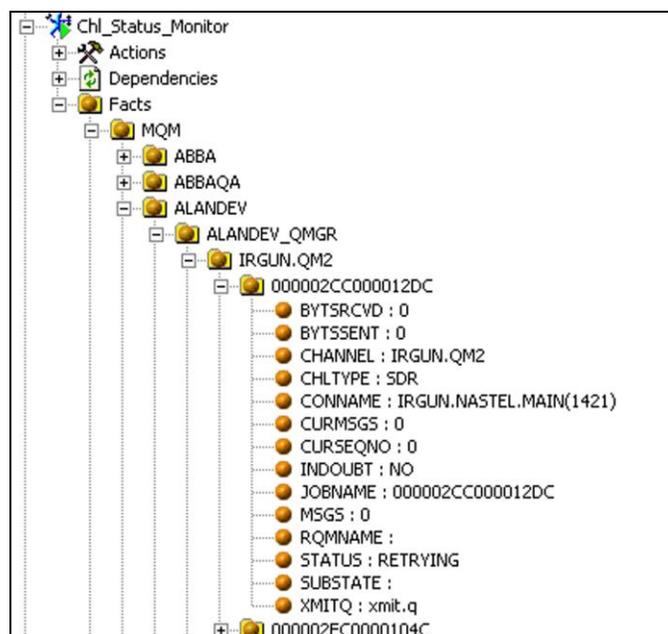


Figure 7-7. Sample UA Channel Status Monitor Metrics

7.2.3 IBM MQ UA Cluster Qmgr Monitor Metrics

Table 7-7. IBM MQ UA Cluster Qmgr Monitor Metrics Facts			
Parameter	Type	Values	Description
CHANNEL	String		Name of channel.
CLUSQMGR	String		Name of cluster queue manager.
CLUSTER	String		Name of cluster.
CONNAME		Specify the fully qualified DNS name or IP address of the host together with an optional port number. Maximum string length is 264 characters.	The DNS name or IP address of the host on which the LDAP server is running, together with an optional port number. The default port number is 389. No default is provided for the DNS name or IP address.
DEFTYPE	String	Sender, Receiver, Requester, Server, SrvConn, ClntConn, ClusterReceiver, ClusterDriver, ClusterSender	Channel definition type.
QMTYPE	String	Normal, Repository	Function of the queue manager in the cluster.
SUSPEND	String	Yes/No	Whether object is removed from its workflow.

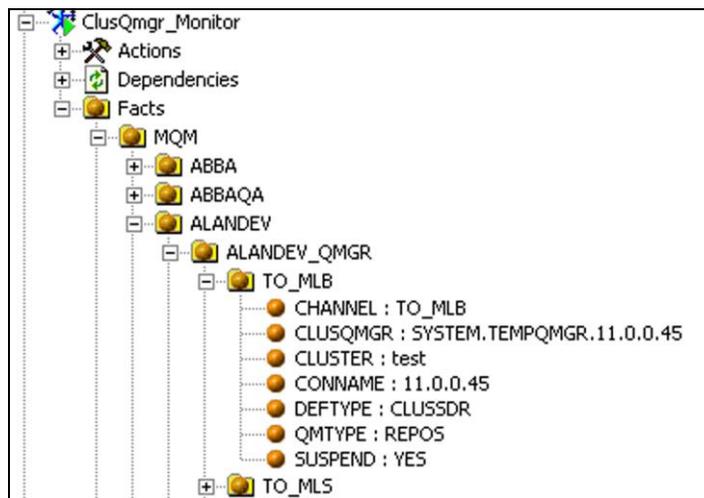


Figure 7-8. Sample UA Cluster Qmgr Monitor Metrics

7.2.4 IBM MQ UA Listener Status Monitor Metrics

Table 7-8. IBM MQ UA Listener Status Monitor Metrics Facts			
Parameter	Type	Values	Description
LISTENER	String		Name of Listener.
PID	Integer	≥ 0	Process identifier of Listener.
STATUS	String	Running, Inactive, Stopped, Retrying, Suspended, Binding	Current listener state.

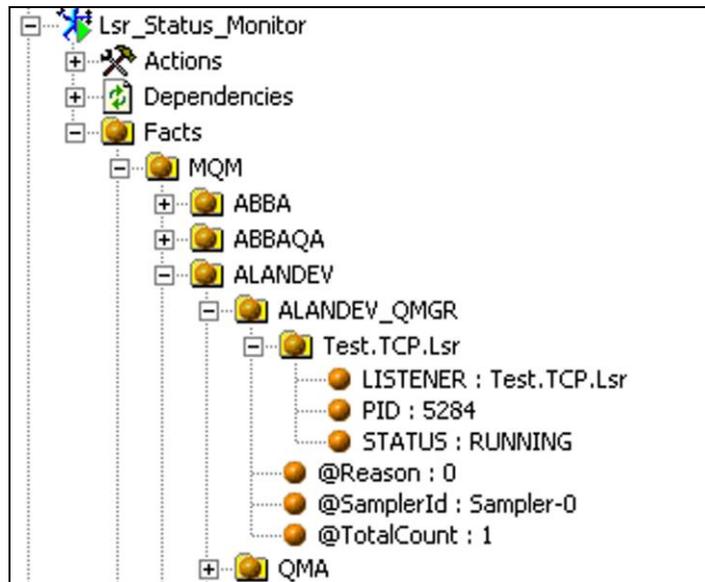


Figure 7-9. Sample of UA Listener Status Monitor Metrics

7.2.5 IBM MQ Node Monitor Metrics

Table 7-9. M6 for IBM MQ Node Monitor Metrics Facts			
Parameter	Type	Values	Description
Managed	Boolean	True/false	Whether the M6 for IBM MQ node is being managed.
State	String	Active, Stopped, Unknown	State of M6 for IBM MQ Node (M6 for IBM MQ Agent).

7.2.6 IBM MQ UA Queue Manager Connections Monitor Metrics

Table 7-10. IBM MQ UA Queue Manager Connections Monitor Metrics Facts

Parameter	Type	Values	Description
APPLTAG	String	Example: \nastel\apwmq\bin\nsqmsg.exe	The application name. This is the name of the client application putting the messages to the queue.
APPLTYPE	String	BATCH – Application using a batch connection. RRSBATCH – Resource Recovery Services (RRS) - coordinated application using a batch connection. CICS – CICS transaction. IMS – Information Management System (IMS) transaction. CHINIT – Channel initiator. SYSTEM – Queue manager. USER – User application.	A string indicating the type of the application that is connected to the queue manager.
CHANNEL	String		The name of the channel that owns the handle. If there is no channel associated with the handle, this parameter is blank. This parameter is returned only when the handle belongs to the channel initiator.
CONN			When an application connects to IBM MQ, it is given a unique 24-byte connection identifier (ConnectionId). The value of CONN is formed by converting the last eight bytes of the ConnectionId to its 16-character hexadecimal equivalent.
CONNNAME	String		The connection name associated with the channel that owns the handle. If there is no channel associated with the handle, this parameter is blank. This parameter is returned only when the handle belongs to the channel initiator.
CONNOPTS	String	MQC.MQCNO_STANDARD_BINDING MQC.MQCNO_FASTPATH_BINDING MQC.MQCNO_ISOLATED_BINDING MQC.MQCNO_SHARED_BINDING MQC.MQCNO_RESTRICT_CONN_TAG_Q_MGR MQC.MQCNO_RESTRICT_CONN_TAG_QSG MQC.MQCNO_SERIALIZE_CONN_TAG_Q_MGR MQC.MQCNO_SERIALIZE_CONN_TAG_QSG	The queue manager connection options.
EXTCONN	String		Value of EXTCONN based on first 16 bytes of ConnectionId converted to its 32-character hexadecimal equivalent.
EXTURID	String		External unit of recovery identifier. Persistent token used by Resource Recovery Services (RRS) to identify a transaction.

Table 7-10. IBM MQ UA Queue Manager Connections Monitor Metrics Facts

Parameter	Type	Values	Description
PID	Integer	≥ 0	Number specifying the process identifier of the application that has opened the specified queue. Not valid on z/OS.
QMURID	Integer	≥ 0	The queue manager unit of recovery identifier. On z/OS, this is a 6-byte log RBA, displayed as 12 hexadecimal characters. On platforms other than z/OS, this is an 8-byte transaction identifier, displayed as m.n where m and n are the decimal representation of the first and last 4 bytes of the transaction identifier.
TID	Integer	≥ 0	Number specifying the thread identifier within the application process that has opened the specified queue. This parameter is not valid on z/OS.
TYPE	String	<p>CONN – Connection information for the specified connection. On z/OS, this includes threads which may be logically or actually disassociated from a connection, together with those that are in-doubt and for which external intervention is needed to resolve them. These latter threads are those that DIS THREAD TYPE(INDOUBT) would show.</p> <p>HANDLE – Information relating to any objects opened by the specified connection.</p> <p>ALL – Display all available information relating to the connection.</p>	The type of information returned.
UOWLOG	String		The filename of the extent to which the transaction associated with this connection first wrote. This parameter is valid only on platforms other than z/OS.
UOWLOGDA	Date		The date that the transaction associated with the current connection first wrote to the log.
UOWLOGTI	Float		The time that the transaction associated with the current connection first wrote to the log.
UOWSTATE	String	<p>NONE – There is no unit of work.</p> <p>ACTIVE – The unit of work is active.</p> <p>PREPARED – The unit of work is in the process of being committed.</p> <p>UNRESOLVED – The unit of work is in the second phase of a two-phase commit operation. IBM MQ holds resources on its behalf and external intervention is required to resolve it. This might be as simple as starting the recovery coordinator (such as CICS, IMS, or RRS) or it might involve a more complex</p>	The state of the unit of work.

Table 7-10. IBM MQ UA Queue Manager Connections Monitor Metrics Facts

Parameter	Type	Values	Description
		operation such as using the RESOLVE INDOUBT command. (z/OS only.)	
UOWSTDA	Date		The date that the transaction associated with the current connection was started.
UOWSTTI	Float		The time that the transaction associated with the current connection was started.
URTYPE	String	CICS (valid only on z/OS) XA RRS (valid only on z/OS) IMS (valid only on z/OS) QMGR	The type of unit of recovery as seen by the queue manager.
USERID	String		The user identifier associated with the connection. This parameter is not returned when APPLTYPE has the value SYSTEM.

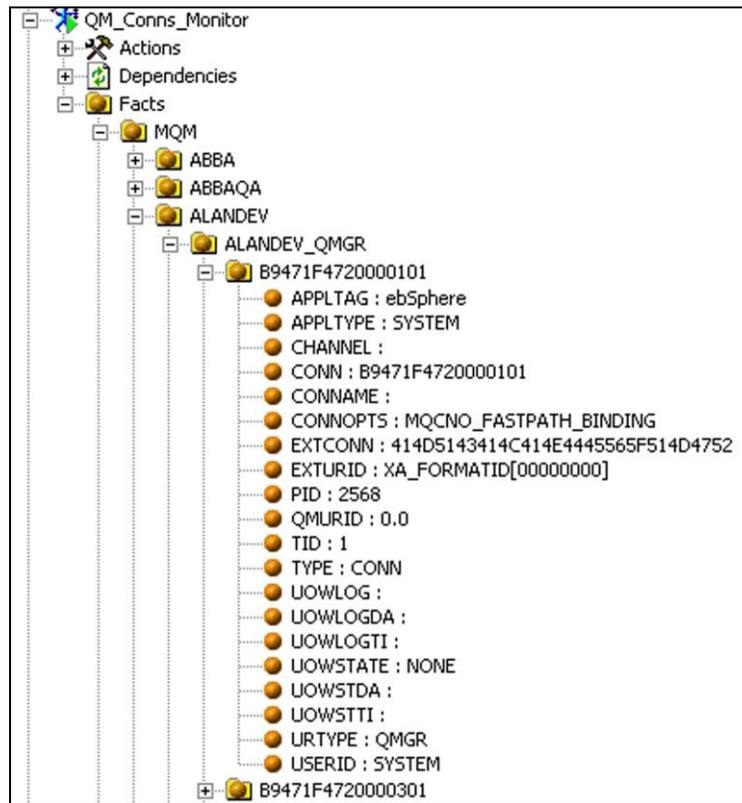


Figure 7-10. Sample UA Queue Manager Connections Monitor Metrics

7.2.7 IBM MQ UA Queue Manager Handles Monitor Metrics

Table 7-11. IBM MQ UA Queue Manager Handles Monitor Metrics Facts			
Parameter	Type	Values	Description
HSTATE	String	ACTIVE – An API call from this connection is currently in progress for this object. INACTIVE – No API call from this connection is currently in progress for this object.	The state of the handle.
OBJNAME	String		The name of an object that the connection has open.
OBJTYPE	String		The type of the object that the connection has open.
OPENOPTS	String		The open options currently in force for the connection for the object.
TYPE	String	Queue Manager/Handle	Specifies the type of status information required.

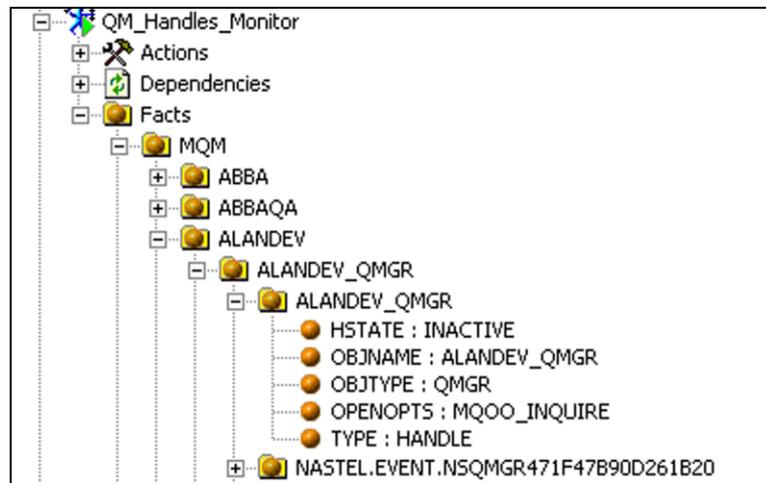


Figure 7-11. Sample UA Queue Manager Handles Monitor Metrics

7.2.8 IBM MQ Universal Agent Queue Manager Monitor Metrics

Table 7-12. IBM MQ UA Queue Manager Monitor Metrics Facts

Parameter	Type	Values	Description
ACCTCONO	String	<p>SAME – Attribute is unchanged.</p> <p>ENABLED – Application may override setting of the ACCTMQI and ACCTQ QMGR attributes using the Options field in the MQCNO structure on the MQCONN API call.</p> <p>DISABLED – Application may not override the setting of ACCTMQI and ACCTQ QMGR attributes using the Options field in MQCNO structure on the MQCONN API call.</p>	Whether applications can override the setting of the ACCTMQI and the ACCTQ values in the QMGR attribute.
ACCTINT	Integer	Ranging from 1 through 604 800 seconds.	The interval, in seconds, at which intermediate accounting records are written. This is valid only on i5/OS, UNIX systems, and Windows.
ACCTMQI		<p>SAME – The attribute is unchanged.</p> <p>OFF – API accounting data collection is switched off.</p> <p>ON – API accounting data collection is switched on.</p>	Whether accounting information is to be collected for MQI data. This is valid only on i5/OS, UNIX systems, and Windows.
ACCTQ	String	<p>OFF – Accounting data collection is disabled for all queues which specify QMGR as the value for their ACCTQ parameter. This is the queue manager's initial default value, except on z/OS where it is ON.</p> <p>ON – Accounting data collection is enabled for all queues which specify QMGR as the value of their ACCTQ parameter. On z/OS systems, you need to have switched on class 3 accounting by the START TRACE command.</p> <p>NONE – Accounting data collection for all queues is disabled regardless of the value of the queue's ACCTQ parameter.</p>	<p>Specifies whether accounting data is to be collected for all queues. On z/OS, the data collected is class 3 accounting data (thread-level and queue-level accounting).</p> <p>Changes to this parameter are effective only for connections to the queue manager occurring after the change to the parameter.</p>
ACTIVREC	String	<p>SAME – Attribute is unchanged.</p> <p>MSG – Report is put to destination specified by the message.</p> <p>QUEUE – Report is put to fixed name queue.</p> <p>DISABLED – No activity reports are generated.</p>	Controls the generation of Activity Reports.
ALTDATE	Date	yyyy-mm-dd	The date on which the definition was last altered, in the form yyyy-mm-dd. This parameter is valid only on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, Windows, and z/OS.
ALTTIME	Time	hh.mm.ss	The time at which the definition was last altered, in the form hh.mm.ss. This parameter is valid only on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, Windows, and z/OS.
AUTHOREV	String	Disabled	Controls whether authorization (Not Authorized) events are generated.
CCSID	Integer		Coded character set identifier.

Table 7-12. IBM MQ UA Queue Manager Monitor Metrics Facts

Parameter	Type	Values	Description
CHAD	String	Disabled/enabled	Whether auto-definition of receiver and server-connection channels is enabled. Only valid on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, and Windows.
CHADEV	String	Disabled/enabled	Whether auto-definition events are enabled. Only valid on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, and Windows.
CHADEXIT	String		The name of the channel auto-definition exit. Only valid on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, Windows and z/OS.
CHLEV	String	DISABLED/ENABLED – None/All channel events are generated. EXCEPTION – All exception channel events are generated.	Whether channel events are generated.
CLWLDATA	String		The data passed to the cluster workload exit. Only valid on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, Windows, and z/OS.
CLWLEXIT	String		The name of the cluster workload exit. Only valid on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, Windows, and z/OS.
CLWLEN	Integer	≥ 0	Maximum number of bytes of message data that is passed to the cluster workload exit. Only valid on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, Windows, and z/OS.
CLWLMRUC	Integer	Ranging from 1 through 999 999 999.	The maximum number of most recently used outbound cluster channels.
CLWLUSEQ	String	LOCAL – The local queue is the only target for MQPUT operations. This is the queue manager's initial default value. ANY – The queue manager treats the local queue as another instance of the cluster queue for the purposes of workload distribution.	For queues whose CLWLUSEQ parameter has a value of QMGR, specifies the behavior of an MQPUT operation when the target queue has a local instance and at least one remote cluster instance (except where the MQPUT originates from a cluster channel).
CMDLEVEL	Integer		Command level. Indicates the function level of the queue manager.
COMMANDQ	String		Name of the system-command input queue.
CRDATE	Date		Creation date of the queue manager.
CRTIME	Float		Creation time of the queue manager.
DEADQ	String		Name of the queue to which messages are sent if they cannot be routed to their correct destination (dead-letter queue or undelivered-message queue). The default is blanks.
DEFXMITQ	String		Default transmission queue name.
DESCR	String		Plain-text comment. It provides descriptive information about the queue manager.
DISTL	String	Yes/No	Whether distribution lists are supported by the queue manager. Only valid on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, and Windows.

Table 7-12. IBM MQ UA Queue Manager Monitor Metrics Facts

Parameter	Type	Values	Description
INHIBTEV	String	Enabled/disabled	Whether Inhibit events are generated.
IPADDRV	String	IPV4 – The IPv4 IP address to be used. IPV6 – The IPv6 address to be used.	Specifies which IP protocol is to be used for channel connections.
LOCALEV	String	Disabled/enabled.	Whether Local events are generated.
LOGGEREV	String	Disabled/enabled.	Whether recovery log events are generated. This parameter is not valid on z/OS.
MAXHANDS	Integer	≥ 0	The maximum number of open handles that any one connection can have at any one time. This parameter is ignored on Compaq NonStop Kernel.
MAXMSGL	Integer	≥ 0	The maximum message length handled by QMGR.
MAXPRTY	Integer	≥ 0	Maximum priority.
MAXUMSGS	Integer	≥ 0	Maximum messages allowed.
MONACLS	String	QMGR – Collection of online monitoring data is inherited from the setting of the queue manager's MONCHL parameter. This is the queue manager's initial default value. OFF – Monitoring is switched off. LOW – Unless MONCHL is NONE, monitoring is switched on with a low rate of data collection with a minimal impact on system performance. Data collected is not likely to be the most current. MEDIUM – Unless MONCHL is NONE, monitoring is switched on with a moderate rate of data collection with limited impact on system performance. HIGH – Unless MONCHL is NONE, monitoring is switched on with a high rate of data collection with a likely impact on system performance. Data collected is the most current available.	Controls the collection of online monitoring data for auto-defined cluster-sender channels. A change to this parameter takes effect only on channels started after the change occurs. Any channel started before the change to the parameter continues with the value in force at the time that the channel started.
MONCHL	String	OFF – Online monitoring data collection is turned off for channels specifying a value of QMGR in their MONCHL parameter. NONE – Online monitoring data collection is turned off for channels regardless of the setting of their MONCHL parameter. LOW – Online monitoring data collection is turned on, with a low ratio of data collection, for channels specifying a value of QMGR in their MONCHL parameter. MEDIUM – Online monitoring data collection is turned on, with a moderate ratio of data collection, for channels specifying a value of QMGR in their MONCHL parameter. HIGH – Online monitoring data collection is turned on, with a high ratio of data collection, for channels specifying a value of QMGR in their MONCHL parameter.	Controls the collection of online monitoring data for channels. A change to this parameter takes effect only on channels started after the change occurs. Any channel started before the change to the parameter continues with the value in force at the time that the channel started.

7-12. IBM MQ UA Queue Manager Monitor Metrics Facts			
Parameter	Type	Values	Description
MONQ	String	<p>OFF – Online monitoring data collection is turned off for queues specifying a value of QMGR in their MONQ parameter. This is the queue manager's initial default value.</p> <p>NONE – Online monitoring data collection is turned off for queues regardless of the setting of their MONQ parameter.</p> <p>LOW – Online monitoring data collection is turned on, with a low ratio of data collection, for queues specifying a value of QMGR in their MONQ parameter.</p> <p>MEDIUM – Online monitoring data collection is turned on, with a moderate ratio of data collection, for queues specifying a value of QMGR in their MONQ parameter.</p> <p>HIGH – Online monitoring data collection is turned on, with a high ratio of data collection, for queues specifying a value of QMGR in their MONQ parameter.</p>	<p>Controls the collection of online monitoring data for queues.</p> <p>Changes to this parameter take immediate effect on the collection of monitoring data for the affected queues.</p>
PERFMEV	String	Enabled/disabled	Whether Performance events are generated.
PLATFORM	String		Platform IBM MQ is running on.
QMID	String		The unique identifier of the queue manager.
QMNAME	String		Queue Manager name.
REMOTEEV	String	Enabled/disabled	Controls whether remote error events are generated.
REPOS	String		<p>Name of cluster for which this queue manager is to provide a repository manager service.</p> <p>This parameter is valid only on AIX, HP OpenVMS, HP-UX, Linux, i5/OS, Solaris, Windows, and z/OS.</p>
REPOSNL	String		Repository namelist – The name of a list of clusters for which this queue manager is to provide a repository service.
ROUTEREC	String	<p>DISABLED – Trace-route information is not recorded.</p> <p>MSG – Trace-route information is recorded and sent to the destination specified by the originator of the message causing the trace route record. This is the queue manager's initial default value.</p> <p>QUEUE – Trace-route information is recorded and sent to SYSTEM.ADMIN.TRACE.ROUTE.QUEUE.</p>	<p>Whether trace-route information is recorded if requested in the message. If participation in route tracing is enabled by this queue manager parameter not being set to DISABLED, the value of the parameter is only important should a reply be generated. The reply goes either to SYSTEM.ADMIN.TRACE.ROUTE.QUEUE, or to the destination specified by the message itself. Provided ROUTEREC is not DISABLED, messages not yet at the final destination may have information added to them.</p>
SCHINIT	String	<p>QMGR – The channel initiator will start automatically when the queue manager starts.</p> <p>MANUAL – The channel initiator will not start automatically.</p>	<p>Whether the channel initiator should start automatically when the queue manager starts.</p> <p>This parameter is valid only on AIX, HP-UX, Linux, i5/OS, Solaris, and Windows.</p>

7-12. IBM MQ UA Queue Manager Monitor Metrics Facts

Parameter	Type	Values	Description
SCMDSERV	String	<p>QMGR – The command server will start automatically when the queue manager starts.</p> <p>MANUAL – The command server will not start automatically.</p>	<p>Whether the command server should start automatically when the queue manager starts.</p> <p>This parameter is valid only on AIX, HP-UX, Linux, i5/OS, Solaris, and Windows.</p>
SSLRLNL	String		Indicates the namelist of AUTHINFO objects being used for the queue manager for CRL checking.
SSLCRYP	String	<p>GSK_ACCELERATOR_RAINBOW_CS_OFF</p> <p>GSK_ACCELERATOR_RAINBOW_CS_ON</p> <p>GSK_ACCELERATOR_NCIPHER_NF_OFF</p> <p>GSK_ACCELERATOR_NCIPHER_NF_ON</p> <p>GSK_PKCS11=<the PKCS #11 driver path and filename>;<the PKCS #11 token label>;<the PKCS #11 token password>;<symmetric cipher setting></p>	<p>Sets the name of the parameter string required to configure the cryptographic hardware present on the system.</p> <p>The strings containing RAINBOW enable or disable the Rainbow CryptoSwift cryptographic hardware.</p> <p>The strings containing NCIPHER enable or disable the nCipher nFast cryptographic hardware.</p>
SSLEV	String	Disabled/enabled	Whether SSL events are generated.
SSLFIPS	String	<p>NO – IBM MQ provides an implementation of SSL cryptography which supplies FIPS-certified modules for all Version 6.0 platforms. If you set SSLFIPS to NO, any CipherSpec supported on a particular platform can be used. This is the queue manager's initial default value.</p> <p>YES – Specifies that only FIPS-certified algorithms are to be used in the CipherSpecs allowed on all SSL connections from and to this queue manager.</p>	<p>SSSLFIPS specifies whether only FIPS-certified algorithms are to be used if cryptography is carried out in IBM MQ. If cryptographic hardware is configured, the cryptographic modules used are those provided by the hardware product, and these may, or may not, be FIPS-certified to a particular level. This depends on the hardware product in use. Valid only on Windows and UNIX platforms.</p>
SSLKEYR	String		The name of the Secure Sockets Layer key repository.
SSLRKEYC	Integer	<p>Ranging from zero through 9999.</p> <p>(To avoid problems with storage allocation, do not set the SSLTASKS parameter to a value greater than 50.)</p>	<p>The number of server subtasks to use for processing SSL calls. To use SSL channels, you must have at least two of these tasks running. Only valid on z/OS.</p> <p>Changes to this parameter will be effective when the channel initiator is restarted.</p>
STATCLS	String	<p>QMGR – Collection of statistics data is inherited from the setting of the queue manager's STATCHL parameter. This is the queue manager's initial default value.</p> <p>OFF – Statistics data collection for the channel is switched off.</p> <p>LOW – Unless STATCHL is NONE, statistics data collection is switched on with a low ratio of data collection with a minimal impact on system performance.</p> <p>MEDIUM – Unless STATCHL is NONE, statistics data collection is switched on with a moderate ratio of data collection.</p> <p>HIGH – Unless STATCHL is NONE, statistics data collection is switched on with a high ratio of data collection.</p>	<p>Whether statistics data is to be collected for auto-defined cluster-sender channels. Only valid on i5/OS, UNIX systems, and Windows.</p> <p>A change to this parameter takes effect only on channels started after the change occurs. Any channel started before the change to the parameter continues with the value in force at the time that the channel started.</p>

7-12. IBM MQ UA Queue Manager Monitor Metrics Facts			
Parameter	Type	Values	Description
STATCHL	String	<p>NONE – Statistics data collection is turned off for channels regardless of the setting of their STATCHL parameter. This is the queue manager's initial default value.</p> <p>OFF – Statistics data collection is turned off for channels specifying a value of QMGR in their STATCHL parameter.</p> <p>LOW – Statistics data collection is turned on, with a low ratio of data collection, for channels specifying a value of QMGR in their STATCHL parameter.</p> <p>MEDIUM – Statistics data collection is turned on, with a moderate ratio of data collection, for channels specifying a value of QMGR in their STATCHL parameter.</p> <p>HIGH – Statistics data collection is turned on, with a high ratio of data collection, for channels specifying a value of QMGR in their STATCHL parameter.</p>	<p>Whether statistics data is to be collected for channels. Only valid on i5/OS, UNIX systems, and Windows.</p> <p>A change to this parameter takes effect only on channels started after the change occurs. Any channel started before the change to the parameter continues with the value in force at the time that the channel started.</p>
STATINT	Integer	Ranging from 1 through 604 800. The queue manager's initial default value is 1800.	<p>The time interval, in seconds, at which statistics monitoring data is written to the monitoring queue. Only valid on AIX, HP-UX, Linux, i5/OS, Solaris, and Windows.</p> <p>Changes to this parameter take immediate effect on the collection of monitoring and statistics data.</p>
STATMQI	String	<p>OFF – Data collection for MQI statistics is disabled. This is the queue manager's initial default value.</p> <p>ON – Data collection for MQI statistics is enabled.</p>	Whether statistics monitoring data is to be collected for the queue manager. Only valid on i5/OS, UNIX systems, and Windows.
STATQ	String	<p>NONE – Statistics data collection is turned off for queues regardless of the setting of their STATQ parameter. This is the queue manager's initial default value.</p> <p>OFF – Statistics data collection is turned off for queues specifying a value of QMGR in their STATQ parameter.</p> <p>ON – Statistics data collection is turned on for queues specifying a value of QMGR in their STATQ parameter.</p>	<p>Whether statistics data is to be collected for queues. Only valid on i5/OS, UNIX systems, and Windows.</p> <p>Changes to this parameter take immediate effect on the collection of statistics data for the affected queues.</p>
STRSTPEV	String	Enabled/disabled	Controls whether start and stop events are generated.
TRIGINT	Integer	≥ 0	Specifies the trigger time interval, expressed in milliseconds, for use only with queues where <i>TriggerType</i> has a value of MQTT_FIRST.



Figure 7-12. Sample UA Queue Manager Monitor Metrics

7.2.9 IBM MQ UA Queue Manager Status Monitor Metrics

Table 7-13. IBM MQ UA Queue Manager Status Monitor Metrics Facts			
Parameter	Type	Values	Description
CHINIT	String		Channel initiator status.
CMDSERV	String		Command Server status.
CONNS	Integer	≥ 0	The current number of connections to the queue manager.
QMNAME	String		Name of queue manager.
STATUS	String	Running, Inactive, Stopped, Retrying, Suspended, Binding	Current queue manager state.

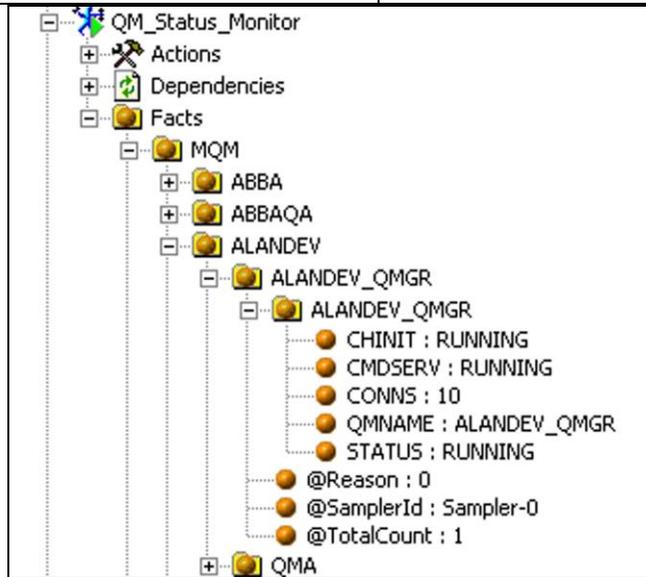


Figure 7-13. Sample UA Queue Manager Status Monitor Metrics

7.2.10 IBM MQ QMGR Monitor Metrics

Facts

Table 7-14. IBM MQ Queue Manager Metrics Parameters			
Parameter	Type	Values	Description
State	String	Active, Stopped, Unknown	Queue Manager state.
DeadLetterQName	String		Queue Manager dead letter queue name.

Actions

Table 7-15. IBM MQ Queue Manager Metrics Actions	
Action	Description
Stop-Qmgr	Stops associated queue manager. This action performs a controlled queue manager shutdown.
Start-Qmgr	Starts associated queue manager.

7.2.11 IBM MQ UA Queue Handles Monitor Metrics

Table 7-16. IBM MQ UA Queue Handles Monitor Metrics Facts

Parameter	Type	Values	Description
APPLTAG	String	Example: \nastel\apwmsg\bin\nsqmsg.exe	The application name. This is the name of the client application putting the messages the queue.
APPLTYPE	String	BATCH – Application using a batch connection. RRSBATCH – RRS-coordinated application using a batch connection. CICS – CICS transaction. IMS – IMS transaction. CHINIT – Channel initiator. SYSTEM – Queue manager. USER – User application.	A string indicating the type of the application that is connected to the queue manager.
BROWSE	String	Yes/No	Specifies whether messages returned are browsed only. This means that the information remains on the queue for future display operations.
CHANNEL	String		The name of the channel that owns the handle. If there is no channel associated with the handle, this parameter is blank. This parameter is returned only when the handle belongs to the channel initiator.
CONNAME	Integer		The DNS name or IP address of the host on which the LDAP server is running, together with an optional port number. The default port number is 389. No default is provided for the DNS name or IP address.
HSTATE	String	ACTIVE – An API call from this connection is currently in progress for this object. INACTIVE – No API call from this connection is currently in progress for this object.	The state of the handle.
INPUT	String	NO – The job does not have the queue open for input. SHARED – The job has the queue open for shared input. EXCL – The job has the queue open for exclusive input.	Whether the job has the queue open for input.
INQUIRE	String	Yes/No	Whether the job has the queue open for inquiry.
OUTPUT	String	Yes/No	Whether the job has the queue open for output.
PID	Integer	≥ 0	Number specifying the process identifier of the application that has opened the specified queue. Not valid on z/OS.
QMURID	String		The queue manager unit of recovery identifier. On z/OS, this is a 6-byte log RBA, displayed as 12 hexadecimal characters. On platforms other than z/OS, this is an 8-byte transaction identifier, displayed as m.n where m and n are the decimal representation of the first and last 4 bytes of the transaction identifier.
QUEUE	String		Name of queue.
SET	String	Yes/No	Indicates whether the handle is providing set access to the queue.

Table 7-16. IBM MQ UA Queue Handles Monitor Metrics Facts			
Parameter	Type	Values	Description
TID	Integer	≥ 0	Number specifying the thread identifier within the application process that has opened the specified queue. This parameter is not valid on z/OS.
TYPE	String	Queue/Handle	Specifies the type of status information required.
URID	String		The external unit of recovery identifier associated with the connection. It is the recovery identifier known in the external syncpoint coordinator. Its format is determined by the value of URTYPE.
URTYPE	String	QMGR – Queue manager unit of work recovery identifier. XA – XA unit of work recovery identifier.	The type of unit of recovery as seen by the queue manager.

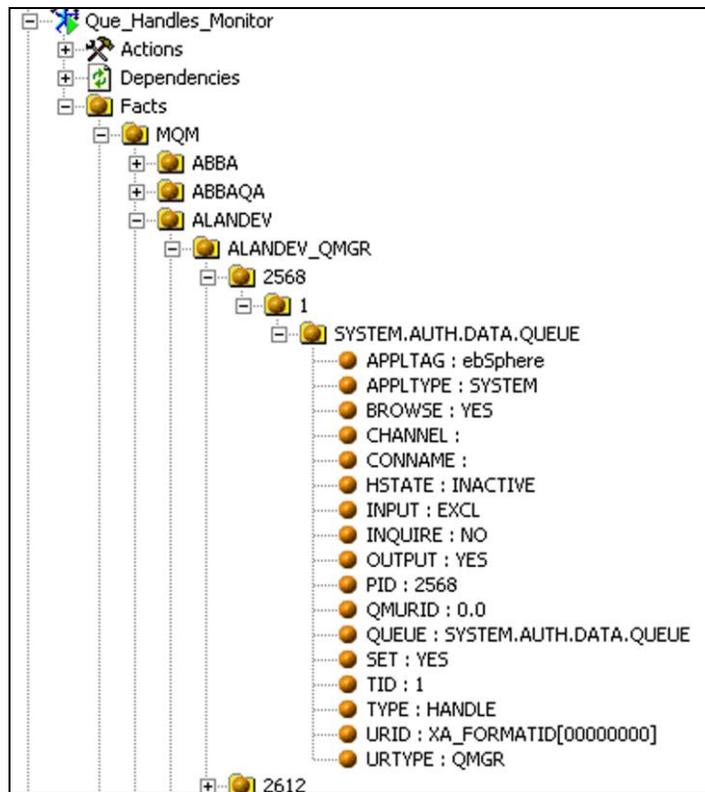


Figure 7-14. Sample UA Queue Handles Monitor Metrics

7.2.12 IBM MQ UA Queue Monitor Metrics

Facts

Table 7-17. IBM MQ UA Queue Monitor Metrics Facts			
Parameter	Type	Values	Description
CURDEPTH	Integer	≥ 0	Current queue depth – number of messages on the queue.
DEFTYPE	String	Active, Stopped, Unknown	State of M6 for IBM MQ Node.
GET	String	Enabled, Disabled	Status of received messages.
IPPROCS	Integer	≥ 0	Number of applications that have the queue open for input (reading the queue).
MAXDEPTH	Integer	≥ 0	Maximum queue depth.
OPPROCS	Integer	≥ 0	Number of applications that have the queue open for output (writing to the queue).
PUT	String	Enabled, Disabled	Status of sent messages.
QUEUE	String		Name of queue.
TYPE	String	Local	Type of queue.
USAGE	String	Normal/Transmission	Queue usage.

Actions

Table 7-18. IBM MQ UA Queue Monitor Metrics Actions	
Action	Description
Clear-Queue	Clears associated queue.
Enable-Get	Enable get on the associated queue.
Disable-Get	Disable get on the associated queue.
Enable-Trigger	Enable trigger control on the associated queue.
Disable-Trigger	Disable trigger control on the associated queue.

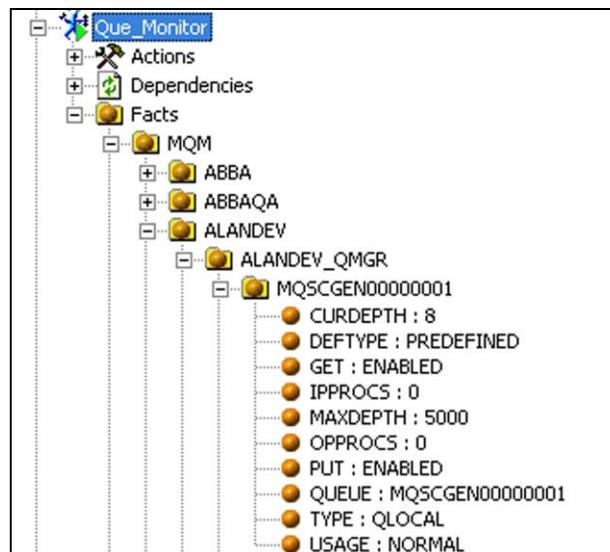


Figure 7-15. Sample UA Queue Monitor Metrics

7.2.13 IBM MQ UA Queue Status Monitor Metrics

Facts

Table 7-19. IBM MQ UA Queue Statistics Monitor Metrics Facts			
Parameter	Type	Values	Description
CURDEPTH	Integer	≥ 0	Current queue depth – number of messages on the queue.
IPPROCS	Integer	≥ 0	Number of applications that have the queue open for input (reading the queue).
LGETDATE	Date		The date on which the last message was retrieved from the queue since the queue manager started.
LGETTIME	Float		The time at which the last message was retrieved from the queue since the queue manager started.
LPUTDATE	Date		The date on which the last message was put to the queue since the queue manager started.
LPUTTIME	Float		The time at which the last message was put to the queue since the queue manager started.
MONQ	String		Current level of monitoring data collection for the queue.
MSGAGE	Integer	≥ 0	Age, in seconds, of the oldest message on the queue.
OPPROCS	Integer	≥ 0	Number of applications that have the queue open for output (writing to the queue).
QTIME	Float		Interval, in microseconds, between messages being put on the queue and then being destructively read.
QUEUE	String		Name of queue.
TYPE	String	Queue/Handle	Specifies the type of status information required.
UNCOM	String	Yes/No	Indicates whether there are any uncommitted changes (puts and gets) pending for the queue.

Actions

See IBM MQ UA Queue Monitor Metrics.

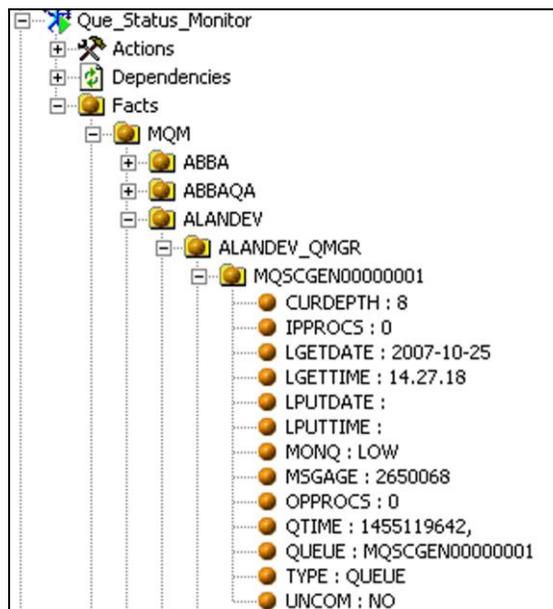


Figure 7-16. Sample UA Queue Status Monitor Metrics

7.2.14 IBM MQ Reset Queue Statistics Metrics

Table 7-20. IBM MQ Reset Queue Statistics Metrics Facts

Parameter	Type	Values	Description
CurrentQDepth	Integer	≥ 0	Current queue depth – number of messages on the queue.
DeqCount	Integer	≥ 0	Number of messages de-queued since last snapshot.
Draining	Boolean	True/false	Whether the queue is being drained.
EnqCount	Integer	≥ 0	Number of messages en-queued since last snapshot.
FillRate	Float		Msg/sec rate at which queue is filling/drained. Drainage is shown as a negative value.
HighQDepth	Integer	≥ 0	Peak queue depth since last snapshot.
Inputs	Integer	≥ 0	Number of applications that have the queue open for input (reading the queue).
LoadIndex	Percent	≥ 0	Current queue depth divided by the maximum queue depth.
MaxQDepth	Integer	≥ 0	Maximum queue depth since last snapshot.
Outputs	Integer	≥ 0	Number of applications that have the queue open for output (writing to the queue).
ResetqReasonCode	Integer	≥ 0	M6 for IBM MQ or IBM MQ reset queue reason code.
ResetqStatusCode	String	Successful/Unsuccessful	Queue reason qualifier.
TimeOfLastResetq	Float		Date and time the last queue was reset.
TimeSinceReset	Integer	≥ 0	Time elapsed since the last reset.
TimeTillFull	Integer	≥ 0	Time in seconds until the queue becomes full since last snapshot. Calculated based on FillRate and MaxQDepth.
TriggerControl	String	On, Off	Queue trigger control.

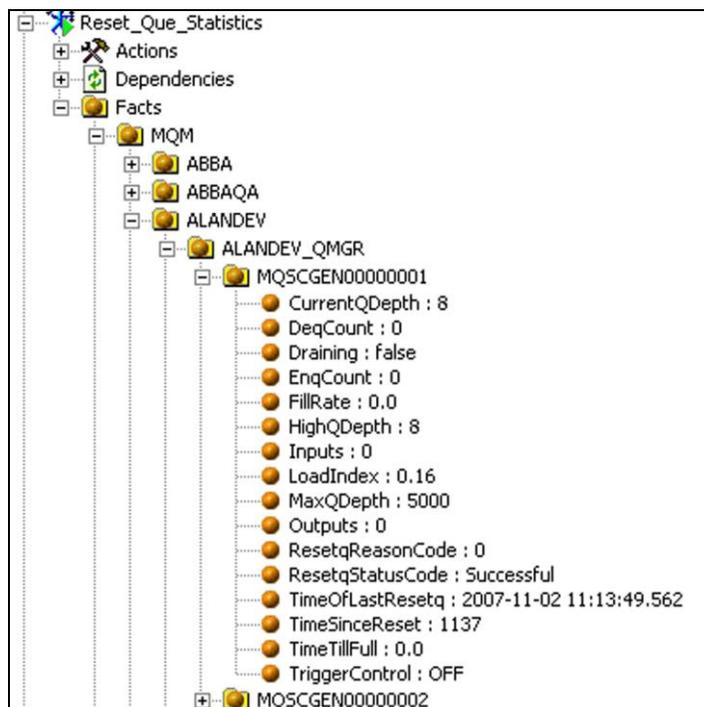


Figure 7-17. Sample Reset Queue Statistics Metrics

7.2.15 IBM MQ UA Server Status Monitor Metrics

Table 7-21. IBM MQ UA Server Status Monitor Metrics Facts			
Parameter	Type	Values	Description
@Reason	Integer	≥ 0	Reason Code for the queue manager selected.
@SamplerID			Displays which sampler the MQ managed node is part of.
@TotalCount	Integer	≥ 0	Total number.

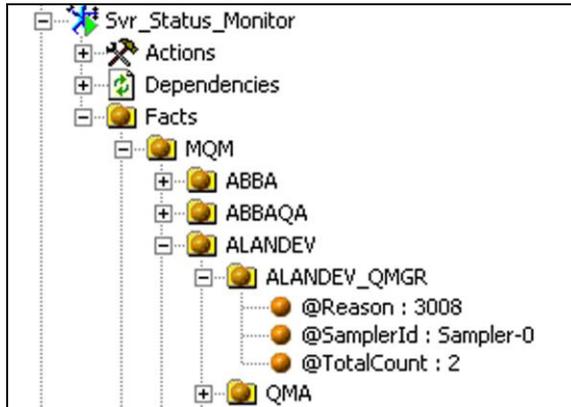


Figure 7-18. Sample UA Server Status Monitor Metrics

7.3 IBM MQ Universal Agent Metrics

IBM MQ Universal Agent metrics does not have a standard set of published metrics. It varies depending on the configuration of the monitors. The monitor uses MQSC tokens as metrics. Refer to *IBM MQ Command Reference* for more information on MQSC.

Below is an example of published metrics when used with:

```
MQSC Command = DISPLAY QUEUE (*) TYPE (QLOCAL) ALL
```

Table 7-22. IBM MQ Universal Agent Metrics Facts

Parameter	Type	Values	Description
CURDEPTH	Integer	≥ 0	Current queue depth – number of messages on the queue.
DEFTYPE	String	Active, Stopped, Predefined, Unknown	State of M6 for IBM MQ Node.
IPPROCS	Integer	≥ 0	Number of applications that have the queue open for input (reading the queue).
MAXDEPTH	Integer	≥ 0	Maximum number of queues permitted.
OPPROCS	Integer	≥ 0	Number of applications that have the queue open for output (writing to the queue).
QUEUE	String		Name of queue.
TYPE	String		Queue type.
USAGE	String	Normal/Transmission	Queue usage.

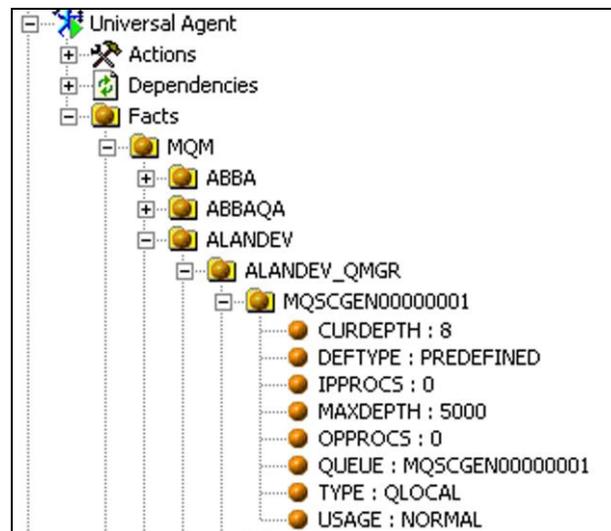


Figure 7-19. Sample of Universal Agent Metrics (Typical)

7.4 Message Scanner Metrics

Table 7-23. Message Scanner Expert Fact Metrics

Name	Description	Possible Values
Queue Manager		
commandInputQueue	PCF Command Input Queue for Queue Manager	
commandLevel	Indicates the level of system control commands supported by the queue manager.	Version Release Levels
connected		True False
distribListCapable	Indicates whether distribution-list messages can be placed on the queue.	MQDL SUPPORTED MQDL NOT SUPPORTED
maximumMessageLength	Upper limit for the length of the longest physical message that can be placed on the queue.	Lower limit for the <i>MaxMsgLength</i> attribute is zero; the upper limit is 100 MB
maximumPriority	Maximum message priority supported by the queue manager.	Priorities range from zero (lowest) to <i>MaxPriority</i> (highest).
reason	MQCONN Reason Code	
syncpointAvailability	Indicates whether the local queue manager supports units of work and syncpointing with the MQGET, MQPUT, and MQPUT1 calls.	MQSP_AVAILABLE Units of work and syncpointing available. MQSP_NOT_AVAILABLE Units of work and syncpointing not available.
First	See Table 7-24 .	
Last	See Table 7-24 .	
Oldest	See Table 7-24 .	
Queue		
CurrentDepth	Number of messages currently on the queue.	Value of this attribute fluctuates as the queue manager operates
definitionType	Indicates how the queue was defined.	MQQDT_PREDEFINED MQQDT_PERMANENT MQQDT_TEMPORARY MQQDT_SHARED
inhibitPut	Controls whether put operations for this queue are allowed.	MQQA_PUT_INHIBITED MQQA_PUT_ALLOWED
inhibitGet	Controls whether get operations for this queue are allowed.	MQQA_GET_INHIBITED MQQA_GET_ALLOWED
maximumDepth	Defined upper limit for the number of physical messages that can exist on the queue at any one time.	≥ 0
maximumMessageLength	Upper limit for the length of the longest physical message that can be placed on the	Lower limit for the <i>MaxMsgLength</i> attribute is

Table 7-23. Message Scanner Expert Fact Metrics

Name	Description	Possible Values
	queue.	zero; the upper limit is 100 MB.
openInputCount	Number of handles that are currently valid for removing messages from the queue by means of the MQGET call. It is the total number of such handles known to the local queue manager.	Value of this attribute fluctuates as the queue manager operates.
openOutputCount	Number of handles that are currently valid for adding messages to the queue by means of the MQPUT call. It is the total number of such handles known to the local queue manager; it does not include opens for output that were performed for this queue at remote queue managers.	Attribute fluctuates as the queue manager operates.
queueType	Type of queue	MQQT_ALIAS Alias queue definition. MQQT_CLUSTER Cluster queue. MQQT_LOCAL Local queue. MQQT_REMOTE Local definition of a remote queue.
shareability	Indicates whether the queue can be opened for input multiple times concurrently.	MQQA_SHAREABLE Queue is shareable. Multiple opens with the MQOO_INPUT_SHARED option are allowed. MQQA_NOT_SHAREABLE Queue is not shareable. An MQOPEN call with the MQOO_INPUT_SHARED option is treated as MQOO_INPUT_EXCLUSIVE.
triggerControl	Controls whether trigger messages are written to an initiation queue to start an application to service the queue.	MQTC_OFF No trigger messages are to be written for this queue. The value of <i>TriggerType</i> is irrelevant in this case. MQTC_ON Trigger messages are to be written for this queue when the appropriate trigger events occur.
triggerDepth	Number of messages of priority <i>TriggerMsgPriority</i> or greater that must be on the queue before a trigger message is written.	One or greater.
triggerMessagePriority	The message priority below which messages do	In the range zero (lowest)

Table 7-23. Message Scanner Expert Fact Metrics

Name	Description	Possible Values
	not contribute to the generation of trigger messages (that is, the queue manager ignores these messages when deciding whether to generate a trigger message).	through <i>MaxPriority</i> (highest)
triggerType	Controls the conditions under which trigger messages are written as a result of messages arriving on this queue.	<p>MQTT_NONE No trigger messages are written as a result of messages on this queue. This has the same effect as setting <i>TriggerControl</i> to MQTC_OFF.</p> <p>MQTT_FIRST A trigger message is written whenever the number of messages of priority <i>TriggerMsgPriority</i> or greater on the queue changes from 0 to 1.</p> <p>MQTT_EVERY A trigger message is written whenever a message of priority <i>TriggerMsgPriority</i> or greater arrives on the queue.</p> <p>MQTT_DEPTH A trigger message is written whenever the number of messages of priority <i>TriggerMsgPriority</i> or greater on the queue equals or exceeds <i>TriggerDepth</i>. After the trigger message has been written, <i>TriggerControl</i> is set to MQTC_OFF to prevent further triggering until it is explicitly turned on again.</p>

Table 7-24. Message Scanner Expert Fact Metrics: First, Last, and Oldest Message

Name	Description	Possible Values
NOTE: The metrics for first, last and oldest facts are obtained from the Message Descriptor of the First Message, Last Message and oldest message in the queue.		
backOutCount	The number of times that a message has been tentatively retrieved and subsequently backed out.	Initial value is zero.
characterSet	Coded Character Set ID.	The initial value is MQCCSI_Q_MGR. The following additional values are possible: MQCCSI_INHERIT MQCCSI_EMBEDDED
encoding	Machine encoding of the message data.	The initial value is MQENC_NATIVE.
expiry	Time-dependent quantity that controls how long IBM MQ retains an unretrieved message before discarding it.	The initial value is MQEI_UNLIMITED.
messageFormat	The name of the format (template) that describes the layout of data in the buffer.	The initial value is MQFMT_NONE. The following additional values are possible: MQFMT_ADMIN MQFMT_CICS ^(R) MQFMT_COMMAND_1 MQFMT_COMMAND_2 MQFMT_DEAD_LETTER_HEADER MQFMT_DIST_HEADER MQFMT_EVENT MQFMT_IMS ^(TM) MQFMT_IMS_VAR_STRING MQFMT_MD_EXTENSION MQFMT_PCF MQFMT_REF_MSG_HEADER MQFMT_RF_HEADER MQFMT_STRING MQFMT_TRIGGER MQFMT_WORK_INFO_HEADER MQFMT_XMIT_Q_HEADER
messageType	The broad categorization of a message.	The initial value is MQMT_DATAGRAM. The following additional values are possible: MQMT_SYSTEM_FIRST MQMT_SYSTEM_LAST MQMT_DATAGRAM MQMT_REQUEST MQMT_REPLY MQMT_REPORT MQMT_APPL_FIRST MQMT_APPL_LAST

Table 7-24. Message Scanner Expert Fact Metrics: First, Last, and Oldest Message

Name	Description	Possible Values
persistence	Indicates that the message is important and must at all times be backed up using persistent storage. This option implies a performance penalty.	The initial value is MQPER_PERSISTENCE_AS_Q_DEF. The following additional values are possible: MQPER_PERSISTENT MQPER_NOT_PERSISTENT
priority	The relative priority for transmission and delivery. Messages of the same priority are usually delivered in the same sequence as they were supplied (although there are several criteria that must be satisfied to guarantee this).	The initial value is MQPRI_PRIORITY_AS_Q_DEF.
putAge_sec	The difference in seconds between current system time and putDateTime as on the MD	
putApplicationName	The name of the application that put a message.	The name of the application that put a message. The initial value is a null string.
putApplicationType	The type of application that put a message.	The initial value is MQAT_NO_CONTEXT. The following additional values are possible: MQAT_AIX ^(R) MQAT_CICS MQAT_CICS_BRIDGE MQAT_DOS MQAT_IMS MQAT_IMS_BRIDGE MQAT_MVS MQAT_NOTES_AGENT MQAT_OS2 MQAT_OS390 MQAT_OS400 MQAT_QMGR MQAT_UNIX ^(R) MQAT_WINDOWS MQAT_XCF MQAT_DEFAULT MQAT_UNKNOWN MQAT_USER_FIRST MQAT_USER_LAST
putDateTime	The date and time on which a message was put.	The initial value is a null string.
replyToQMName	The name of the queue manager to which any reply should be sent.	The initial value is a null string.
replyToQName	The name of the queue to which any reply should be sent.	The initial value is a null string.
userId	A user identity associated with a message.	The initial value is a null string.

7.5 IBM MQ Message Performance Metrics

Message performance metrics is split into three categories:

1. [Summary Indicators](#)
2. [General Indicators](#)
3. [Message Indicators](#)

Summary Indicators

Table 7-25. IBM MQ Message Performance Metrics Summary Indicators

Parameter	Data Type	Units	Description
MINIMUM_ROUND_TRIP	Float	sec/msg	The minimum time for the ping to be sent and the echo reply to be received, in seconds.
MMAXIMUM_ROUND_TRIP	Float	sec/msg	The maximum time for the ping to be sent and the echo reply to be received, in seconds.
AVERAGE_ROUND_TRIP	Float	sec/msg	The average time for the ping to be sent and the echo reply to be received for all messages sent in a batch, in seconds.
AVERAGE_PROPAGATION_TIME	Float	sec/msg	Average time in seconds for the first bit of a ping message to travel over the network link to the echo component. For this statistic to be accurate, the time stamps between the servers sending the ping and sending the echo must be synchronized.
AVERAGE_REFLECTION_TIME	Float	sec/msg	Average time in seconds for the ping message to reflect back from the echo component to the ping component and the echo reply to be read. For this statistic to be accurate, the time stamps between the servers sending the ping and sending the echo must be synchronized.
MESSAGES_SENT	Integer	-	The total number of ping messages sent, included in this report. Value ≥ 0 .
CONFIRMED_EXPIRIES	Integer	-	Number of ping messages which expired before being delivered to the echo application (if coe specified). Value ≥ 0 .
CONFIRMED_DELIVERIES	Integer	-	Number of ping messages which were delivered to the echo application (if cod specified). Value ≥ 0 .
CONFIRMED_ARRIVALS	Integer	-	Number of messages which arrived to the echo application (if coa specified). Value ≥ 0 .
CONFIRMED_EXCEPTIONS	Integer	-	Number of messages which resulted in exceptions (if coe was specified). Value ≥ 0 .
REPORTS_RECEIVED	Integer	-	Total number of confirmation report messages received. Value ≥ 0 .
RESPONSES_RECEIVED	Integer	-	Total number of echo response messages received. Value ≥ 0 .

MESSAGES_RECEIVED	Integer	-	Total number of echo response and COA/COD report messages received. Value ≥ 0 .
BYTES_SENT	Integer	-	Total number of bytes sent. Value ≥ 0 .
BYTES_RECEIVED	Integer	-	Total number of bytes received. Value ≥ 0 .
RESPONSE_REQUEST_RATIO	Float	percent	The ratio of echo responses received to ping requests sent. A value of 100 means that all messages sent received responses.
General Performance Indicators			
TOTAL_PUT_TIME	Float	sec	The total time in seconds to put all the messages.
TOTAL_GET_TIME	Float	sec	The total time in seconds spent waiting for the responses to arrive
AVERAGE_PUT_RATE	Float	msg/sec	The potential messages put rate calculated based on ping messages generated.
AVERAGE_GET_RATE	Float	msg/sec	The potential messages get rate calculated based on echo messages received.
AVERAGE_PUT_BYTES_PER_SEC	Float	bytes/sec	The average of all ping message bytes sent during the batch time.
AVERAGE_GET_BYTES_PER_SEC	Float	bytes/sec	The average of all echo message bytes received during the batch time.
PUT_GET_RATE_RATIO	Float	percent	The ratio of put rate to get rate, as a percentage. A value greater than one hundred means that MQSpeedtest could put messages faster than it could get responses.
Message Performance Indicators			
GROSS_ROUND_TRIP_RATE	Float	msg/sec	Throughput rate (ping requests sent + echo responses received) during the batch interval, msg/sec
GROSS_ROUND_BYTES_PER_SEC	Float	bytes/sec)	Throughput rate (ping requests sent + echo responses received) during the batch interval, bytes per second
EFFECTIVE_ROUND_TRIP_RATE	Float	msg/sec	Effective throughput rate (ping request messages + echo response messages + COA/COD report messages) during the batch interval, msg/sec
CONFIRMATION_OVERHEAD	Float	percent	Percent of messages resulting from COA and COD report messages
AVERAGE_ARRIVAL_RATE	Float	msg/sec	Average rate of ping messages arrived at the destination queue (based on coa, Confirm On Arrival messages)
AVERAGE_DELIVERY_RATE	Float	msg/sec	Average rate of ping messages delivered to the destination application -- the command server or the MQSpeedtest echo component (based on cod, Confirm On Delivery messages)
AVERAGE_MSG_LATENCY_WITH_QD	Float	sec	The number of ping messages on queue for

EPTH			the AVERAGE_MSG_LATENCY metric calculation
AVERAGE_MSG_LATENCY	Float	sec	Average time between a ping message arrival at the target queue and delivery to the target application
MAXIMUM_MSG_LATENCY	Float	sec	Maximum time between a ping message arrival at the target queue and delivery to the target application
MAXIMUM_MSG_LATENCY_WITH_Q_DEPTH	Float	sec	The number of ping messages on queue for the MAXIMUM_MSG_LATENCY metric calculation
TOTAL_BATCH_TIME	Float	sec	The elapsed time in seconds to process the entire batch.
TEST_COMPLETION_CODE	Integer	-	Completion code for the test. 0 indicates that all processing was normal. Value ≥ 0 .

7.6 Accounting and Statistics Message Metrics



NOTE: Only available in M6 for IBM MQ 6.0 and higher.

Accounting and statistics messages are generated by queue managers at a predefined interval. They record information about the MQI operations and activities performed by the IBM MQ application. These messages are not available on z/OS systems. Metrics can be collected by AutoPilot M6 for the following types of messages:

- MQI Accounting messages
- Queue Accounting messages
- Queue Statistics messages
- MQI Statistics messages
- Channel Statistics messages

7.6.1 MQI Accounting Message Metrics

Below is the structure of MQI accounting message facts:

```
\workgroupserver_name\node_name\qmgr_name\appl_name\pid\MQ_Object
```

```
<workgroupserver_name> -- Workgroup server name
```

```
<node_name> -- M6 for IBM MQ node name.
```

```
<qmgr_name> -- Queue manager name.
```

```
<appl_name> -- Application name
```

```
<pid> -- Process identifier
```

```
<MQ_object> -- IBM MQ object name
```

Refer to IBM Knowledge Center, Accounting and Statistics Messages,

[https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_8.0.0/com.ibm.mq.mon.doc/q037240 .htm](https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_8.0.0/com.ibm.mq.mon.doc/q037240.htm),

for descriptions of the MQI accounting message metrics.

Below is an example of MQI accounting message metrics:



Figure 7-20. Example of MQI Accounting Message Metrics

7.6.2 Queue Accounting Message Metrics

Below is the structure of queue accounting message facts:

```
\workgroupserver_name\node_name\qmgr_name\appl_name\pid\
QAccounting\queue_name
```

<workgroupserver_name> -- Workgroup server name.

<node_name> -- M6 for IBM MQ node name.

<qmgr_name> -- Queue manager name.

<appl_name> -- Application name

<pid> -- Process identifier

<queue_name> -- Local queue name.

Refer to IBM Knowledge Center, Accounting and Statistics Messages,

https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_8.0.0/com.ibm.mq.mon.doc/q037240_.htm,

for descriptions of the queue accounting message metrics.

Below is an example of queue accounting message metrics:

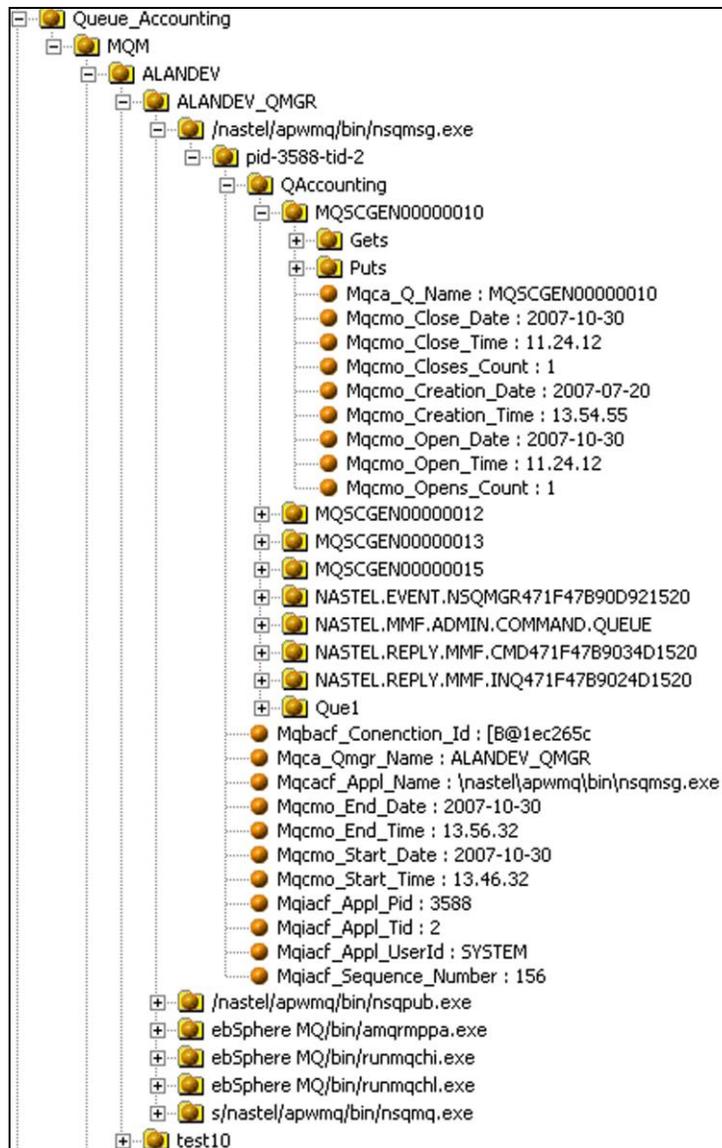


Figure 7-21. Example of Queue Accounting Message Metrics

7.6.3 MQI Statistics Message Metrics

Below is the structure of MQI statistics message facts:

```
\workgroupserver_name\node_name\qmgr_name\MQ_object
<workgroupserver_name> -- Workgroup server name.
<node_name> -- M6 for IBM MQ node name.
<qmgr_name> -- Queue manager name.
<MQ_object> -- IBM MQ object name
```

Refer to IBM Knowledge Center, Accounting and Statistics Messages,

https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_8.0.0/com.ibm.mq.mon.doc/q037240.htm, for descriptions of the MQI statistics message metrics.

Below is an example of MQI statistics message metrics:

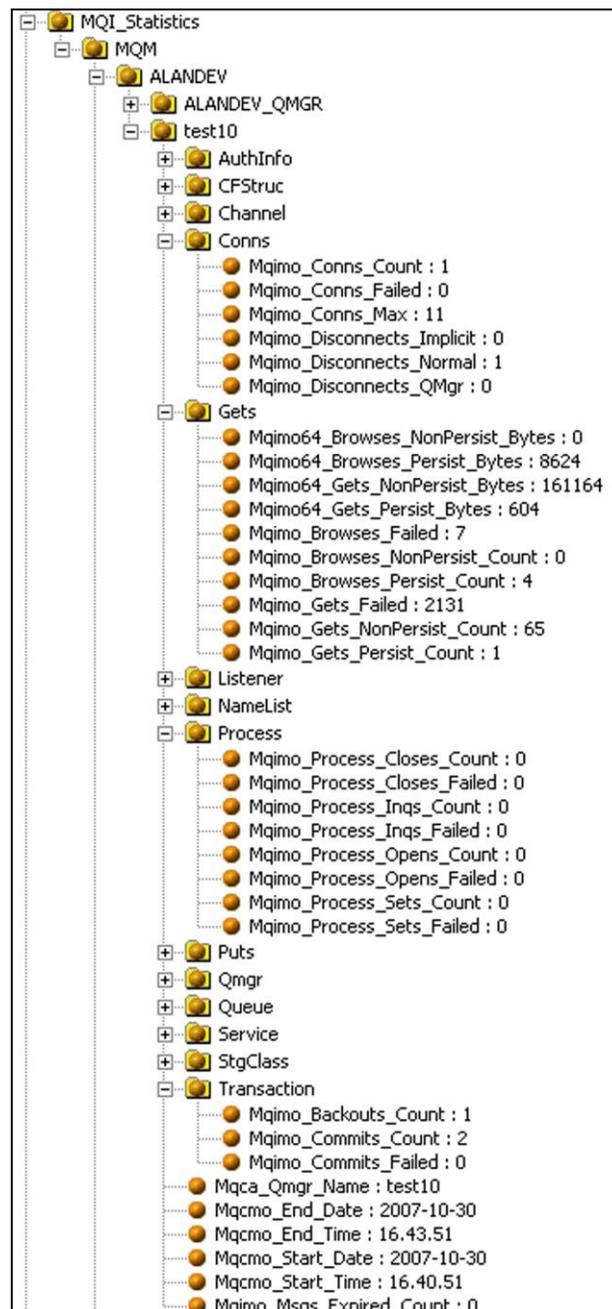


Figure 7-22. Example of MQI Statistics Message Metrics

7.6.4 Queue Statistics Message Metrics

Below is the structure of queue statistics message facts:

```
\workgroupserver_name\node_name\qmgr_name\QStatistics\queue_name
```

<workgroupserver_name> -- Workgroup server name.

<node_name> -- M6 for IBM MQ node name.

<qmgr_name> -- Queue manager name.

<queue_name> -- Local queue name.

Refer to IBM Knowledge Center, Accounting and Statistics Messages,

https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_8.0.0/com.ibm.mq.mon.doc/q037240_.htm, for descriptions of the queue statistics message metrics.

Below is an example of queue statistics message metrics:

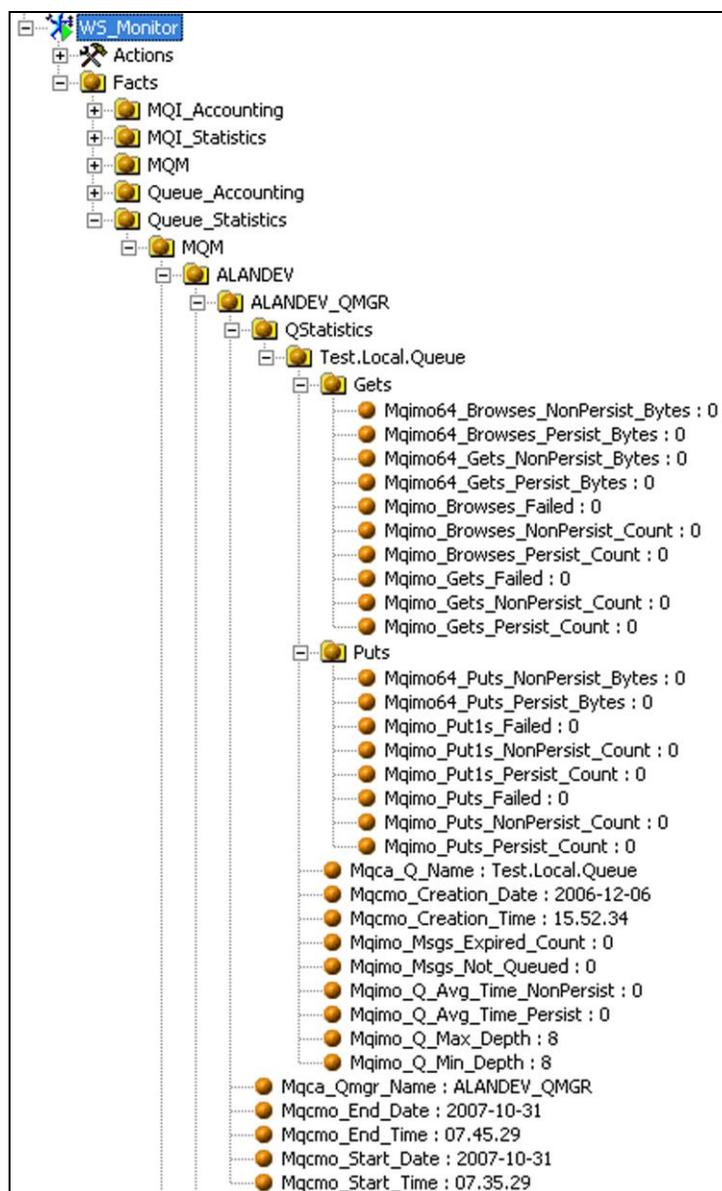


Figure 7-23. Example of Queue Statistics Message Metrics

7.6.5 Channel Statistics Message Metrics

Below is the structure of channel statistics message facts:

```
\workgroupserver_name\node_name\qmgr_name\ChlStatistics\channel_name
```

<workgroupserver_name> -- Workgroup server name.

<node_name> -- M6 for IBM MQ node name.

<qmgr_name> -- Queue manager name.

<channel_name> -- Channel name.

Refer to IBM Knowledge Center, Accounting and Statistics Messages,

[https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_8.0.0/com.ibm.mq.mon.doc/q037240 .htm](https://www.ibm.com/support/knowledgecenter/en/SSFKSJ_8.0.0/com.ibm.mq.mon.doc/q037240.htm),

for descriptions of the channel statistics message metrics.

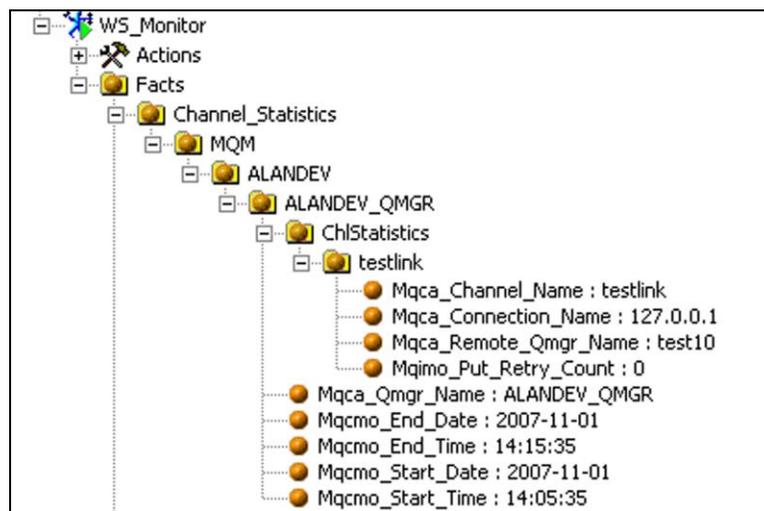


Figure 7-24. Example of Channel Statistics Message Metrics

Appendix A: References

A.1 Nastel Documentation

APM6-INS 622.001 *Nastel AutoPilot M6 Installation Guide*

APM6-USR 624.001 *Nastel AutoPilot M6 User's Guide*

M6WMQ-INS 658.001 *Nastel AutoPilot M6 for IBM MQ Installation Guide*

M6WMQ-ADM 658.001 *Nastel AutoPilot M6 for IBM MQ Administrator's Guide*

A.2 IBM Documentation

SC34-6593 *Monitoring WMQ*

SC34-6595 *IBM MQ Application Programming Guide*

SC33-1872 *IBM MQ Intercommunications*

SC33-1369 *IBM MQ MQSC Command Reference*

SC34-5456 *IBM MQ Using Java*

<http://publib.boulder.ibm.com/infocenter/wmqv6/v6r0/index.jsp?topic=/com.ibm.mq.csqzak.doc/js02908.htm>

A.3 Java™ 2 Platform Standard Edition™ for HP-UX Information Library

<http://www.hp.com/products1/unix/java/infolibrary/index.html>

A.4 Jakarta Documentation References

<http://jakarta.apache.org/site/library.html>

A.5 Oracle Online Documentation

<http://otn.oracle.com/documentation/content.html>

A.6 Tru64 UNIX Online Documentation and References

http://h30097.www3.hp.com/docs/pub_page/doc_list.html

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Appendix B: Conventions

B.1 Typographical Conventions

Table B-1. Typographical Conventions	
Convention	Description
<u>Bold/underlined</u>	Used to identify links to referenced material or websites.
Bold Print	Used to identify topical headings, glossary entries, and to identify toggle or buttons used in procedural steps. Example: Click EXIT .
<i>Italic Print:</i>	Used to place emphasis on a title, menu, screen name, or other categories.
Monospaced bold	Used identify keystrokes/data entries, file names, directory name, etc.
<i>Monospaced italic</i>	Used to identify variables in an address location. Example: [<i>AUTOPILOT_HOME</i>]\documents. Where the portion of the address in the brackets[] is a variable.
monospaced text	Used to identify addresses, commands, scripts, etc.
Normal Text:	Typically used for general text throughout the document.
Table Text	Table text is generally a smaller size to conserve space. 10, 9, and 8 point type is used in tables through the AutoPilot product family documents.

B.2 Naming Conventions

Naming conventions have been adjusted to accommodate IBM's re-naming of MQSeries product to IBM MQ.

Nastel has adapted AutoPilot products to reflect IBM's product naming changes. In the redesign of AutoPilot, we have also defined many elements within the AutoPilot product line.

Table B-2. AutoPilot Related Naming Conventions	
Old Name	New Name
AutoPilot/MQSI	AutoPilot for IBM MQI
AutoPilot/MQW	AutoPilot for IBM MQW
AutoPilot/MQ	AutoPilot for IBM MQ
MQControl	AutoPilot for IBM MQ
MQSeries Plug-in for AutoPilot	AutoPilot for IBM MQ plug-in
MQSeries	IBM MQ (IBM)

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Glossary

AutoPilot: Nastel Technologies' Enterprise Application Management Platform. AutoPilot monitors and automates the management of eBusiness integration components such as middleware application, application servers and user applications.

AutoPilot/IBM MQ: Nastel Technologies' IBM MQ management solution. Re-designated as AutoPilot/IBM MQ with release 4.0 and AutoPilot M6 for IBM MQ with release 6.0. Prior releases retain the MQControl trademark.

AutoPilot/Message Tracking (AP/MT): Nastel's AutoPilot/Message Tracking plug-in that enables AutoPilot/IT to intercept message exits and forward the statistical data to an AutoPilot/IT expert.

AutoPilot/Web: A browser-based interface that provides monitoring and operational control over managed resources and applications. Re-designated as M6 Web Server with release 6.0.

AutoPilot/IBM MQ: AutoPilot/IBM MQ plug-into enables AutoPilot/IT to monitor and manage eBusiness applications for continuous operations in addition to its standard features.

AutoPilot/IBM MQ Message Queue Integrator: Formerly AP/MQSI.

BSV: See Business Views.

Business View (BSV): A collection of rules that define a desired state of an eBusiness environment. Business Views can be tailored to presents information in the form most suited to a given user, as defined by the user.

CEP Server: The Complex Event Processor server; a process. It is a container that can host any number of AutoPilot services such as experts, managers, policies etc.

Client: Any programming component that uses the AutoPilot infrastructure; for example, the AutoPilot Console.

Common Object Request Broker Architecture (CORBA): A Common Object Request Broker Architecture (CORBA) object can be invoked from a Web browser using CGI scripts or applets.

Console: The console acts as the graphical interface for AutoPilot.

Contacts: A subordinate to a given Manager or Expert.

CORBA: See Common Object Request Broker Architecture.

Data Source Name: A Data Source Name (DSN) is the logical name that is used by Open Database Connectivity (ODBC) to refer to the drive and other information that is required to access data. The name is use by Internet Information Services (IIS) for a connection to an ODBC data source, (Example: Microsoft SQL Server database). The ODBC tool in Control Panel is used to set the DSN. When ODBC DSN entries are used to store the connection string values externally, you simplify the information that is needed in the connection string. This makes changes to the data source completely transparent to the code itself.

Decision Support System (DSS): An AutoPilot-based service designed to monitor, store, and display any event information generated by AutoPilot enabled middleware and applications.

Deploy: To put to use, to position for use or action.

Domain Server: An AutoPilot process that provides services to AutoPilot domain clients. It maintains the directory of CEP server nodes, experts etc. Being also a specialized CEP server, the domain server is also capable of hosting AP experts and managers.

DSN: See Data Source Name.

DSS: See Decision Support System

EVT: Event Log file extension (e.g.: *sample.evt*)

Event: An *Event* is something that happens to an object. Events are logged by AutoPilot and are available for use by AutoPilot Policies or the user.

Expert: Services that monitor specific applications such as an applications server, web-server or specific components within the applications (e.g. IBM MQ Application Server). Experts generate facts.

Fact: Facts are single pieces of data that have a unique name and value. One or more facts are used to determine the health of the object, application or server.

Graphic User Interface (GUI): A type of environment that represents programs, files, and options by means of icons, menus, and dialog boxes on the screen. The user can select and activate these options by pointing and clicking with a mouse or, often, with the keyboard. Because the graphical user interface provides standard software routines to handle these elements and report the user's actions (such as a mouse click on a particular icon or at a particular location in text, or a key press); applications call these routines with specific parameters rather than attempting to reproduce them from scratch.

GUI: See Graphic User Interface.

HAQS: See High Availability Queuing Service

High Availability Queuing Service:

IIS: See Internet Information Services

Internet Information Services: Microsoft's brand of Web server software, utilizing HTTP to deliver World Wide Web documents. It incorporates various functions for security, allows CGI programs, and also provides for Gopher and FTP services.

Java: A platform-independent, object-oriented programming language developed and made available by Sun Microsystems.

Java Developer's Kit (JDK): A set of software tools developed by Sun Microsystems, Inc., for writing Java applets or applications. The kit, which is distributed free, includes a Java compiler, interpreter, debugger, viewer for applets, and documentation.

JDBC: See Java Database Connectivity.

Java Database Connectivity (JDBC): The JDBC API provides universal data access from the Java programming language. Using the JDBC 2.0 API, you can access virtually any data source, from relational databases to spreadsheets and flat files. JDBC technology also provides a common base on which tools and alternate interfaces can be built. The *JDBC Test Tool* that was developed by Merant and Sun Microsystems may be used to test drivers, to demonstrate executing queries and getting results, and to teach programmers about the JDBC API.

Java Server Pages (JSP): JSP technology enables rapid development of web-based applications that are platform independent. Java Server Pages technology separates the user interface from content generation enabling designers to change the overall page layout without altering the underlying dynamic content. Java Server Pages technology is an extension of the Java™ Servlet technology.

Java Virtual Machine (JVM): The “virtual” operating system that JAVA-written programs run. The JVM is a hardware- and operating system-independent abstract computing machine and execution environment. Java programs execute in the JVM where they are protected from malicious programs and have a small compiled footprint.

JDK: See Java Developer's Kit.

JRE: JAVA Run-time Environment. The minimum core JAVA required to run JAVA Programs

JSP: See Java Server Pages

JVM: See JAVA Virtual Machine.

Manager: Managers are the home or container for policies. All business views must reside on managers, and manager must be deployed prior to deploying a business view or policy.

Message Queue Interface: The Message Queue Interface (MQI) is part of IBM's Networking Blueprint. It is a method of program-to-program communication suitable for connecting independent and potentially non-concurrent distributed applications.

MOM: See Message-Oriented Middleware.

MQControl: Nastel Technologies' IBM MQ management solution. Has been re-designated as AutoPilot/IBM MQ with release 4.0 and AutoPilot M6 for IBM MQ with release 6.0. Prior releases retain the MQControl trademark.

MQI: See Message Queue Interface

MQSeries: IBM's message queuing product. Renamed by IBM as IBM MQ.

Naming Service: A common server records "names" of objects and associates them with references, locations and properties.

Managed Node: A physical node, for example, an MQ node or Tivoli EMS node, managed by AutoPilot.

ORB: Object Request Broker.

Orbix: CORBA product distributed by IONA Technologies.

Package Manager: The command line utility that allows users to list, install, uninstall, verify and update AutoPilot installation on any CEP server node.

PKGMAN: See Package Manager

Policy/Business Views: Business views are a collection of one or more sensors. Business views are used to visually present the health and status of the different systems as well as automatically issue remedial actions.

Sensor: A rule that is used to determine the health of an object or application based on one or more facts. Actions can then be issued, based on the health.

Simple Mail Transfer Protocol (SMTP): A TCP/IP protocol for sending messages from one computer to another on a network. This protocol is used on the Internet to route e-mail. *See also* communications protocol, TCP/IP. *Compare* CCITT X series, Post Office Protocol.

SMTP: See Simple Mail Transfer Protocol

TCP/IP: See Transmission Control Protocol/Internet Protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP): A protocol developed by the Department of Defense for communications between computers. It is built into the UNIX system and has become the de facto standard for data transmission over networks, including the Internet.

Virtual Machine: Software that mimics the performance of a hardware device, such as a program that allows applications written for an Intel processor to be run on a Motorola chip. *Also See* Java Virtual Machine.

IBM MQ: IBM's message queuing product. Formally known as MQSeries.

IBM_MQ_Manager: A specialized manager capable of hosting one or more IBM MQ specific policies, apart from the regular policies.

Wireless Application Protocol (WAP): An open global specification that is used by most mobile telephone manufacturers. WAP determines how wireless devices utilize Internet content and other services. WAP enables devices to link diverse systems contents and controls.

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