WebSphere Business Integration
Server Express and Express Plus

IBM

Adapter for WebSphere Commerce User Guide

Adapter Version 2.6.x

WebSphere Business Integration
Server Express and Express Plus

Adapter for WebSphere Commerce User Guide

Adapter Version 2.6.x

> **Note!**
>
> Before using this information and the product it supports, read the information in "Notices" on page 97.

21September2005

This edition of this document applies to IBM WebSphere Business Integration Server Express Adapter for WebSphere Commerce (Product ID 5724-H38), version 2.6.x, and to all subsequent releases and modifications until otherwise indicated in new editions.

To send us your comments about this documentation, e-mail doc-comments@us.ibm.com. We look forward to hearing from you.

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

About this document

The IBM^(R) WebSphere^(R) Business Integration Server Express and IBM^(R) WebSphere^(R) Business Integration Server Express Plus are made up of the following components: InterChange Server Express, the associated Toolset Express, Collaboration-Foundation, and a set of software integration adapters. The tools in Toolset Express help you to create, modify, and manage business processes. You can choose from among the prepackaged adapters for your business processes that span applications. The standard processes template--CollaborationFoundation-- allows you to quickly create customized processes.

This document describes the installation, configuration, troubleshooting, and business object development for the WebSphere Business Integration Server Express Adapter for WebSphere Commerce.

Except where noted, all the information in this guide applies to both IBM WebSphere Business Integration Server Express and Express Plus. The term "WebSphere Business Integration Server Express" and its variants refer to both products.

Audience

This document is for consultants, developers, and system administrators who use the connector at customer sites.

Related documents

The complete set of documentation available with this product describes features and components common to all WebSphere adapter installations, and includes reference material on specific components.

You can download, install, and view the documentation from the following site: http://www.ibm.com/websphere/wbiserverexpress/infocenter

Typographic conventions

This document uses the following conventions:

courier font	Indicates a literal value, such as a command name, file name, information that you type, or information that the system prints on the screen.
bold	Indicates a new term the first time that it appears.
italic, italic	Indicates a variable name or a cross-reference.
blue outline	Blue outline, which is visible only when you view the manual online, indicates a cross-reference hyperlink. Click inside the outline to jump to the object of the reference.
/,\	In this document backslashes (\) are used as the convention for directory paths. for Linux and i5/OS installations substitute slashes (/) for backslashes. All WebSphere Business Integration Server Express product pathnames are relative to the directory where the product is installed on your system.

ProductDir	Represents the directory where the WebSphere Business Integration Server Express Adapters product is installed. The default product directory for each platform is as follows: Windows: IBM\WebSphereServer i5/OS: /QIBM/ProdData/WBIServer44/product Linux: /home/${username}/IBM/WebSphereServer
{ }	In a syntax line, curly braces surround a set of options from which you must choose one and only one.
|	In a syntax line, a pipe separates a set of options from which you must choose one and only one.
[ ]	In a syntax line, square brackets surround an optional parameter.
...	In a syntax line, ellipses indicate a repetition of the previous parameter. For example, `option[,...]` means that you can enter multiple, comma-separated options.
< >	Angle brackets surround individual elements of a name to distinguish them from each other, as in `<server_name><connector_name>tmp.log`.

Contents

© Copyright IBM Corp. 2004, 2005 **v**

New in This Release

New in release 2.6.x

Two connector-specific properties have been added: EnableMessageProducerCache and SessionPoolSizeForRequests. For further information, see "Connector-specific configuration properties" on page 27.

When processing a response message to a synchronous request, the connector interprets the feedback code MQFB_NONE (the default feedback code if none is set) as VALCHANGE. For further information, see "Synchronous delivery" on page 8.

As of version 2.6.x, the adapter for CORBA is not supported on Solaris 7, so references to that platform version have been deleted from this guide.

Chapter 1. Overview

This chapter describes the WebSphere Business Integration Server Express Adapter for WebSphere Commerce.

The adapter enables the WebSphere Business Integration Server Express adapter to exchange messages with WebSphere Commerce, Business Edition, version 5.4 with Fixpack 2, version 5.5 with Fixpack 4, and version 5.6. The topics included in this chapter include:

WebSphere Commerce software is a flexible platform for fulfilling a variety of commerce integration roles. The adapter for WebSphere Commerce can be used in a solution that uses the integration broker to integrate business data exchanges between WebSphere Commerce and other enterprise information system applications for which appropriate adapters have been installed.

Connectors consist of an application-specific component and the connector framework. The application-specific component contains code tailored to a particular application. The adapter framework, whose code is common to all adapters, acts as an intermediary between the integration broker and the application-specific component. The adapter framework provides the following services between the integration broker and the application-specific component:

- Receives and sends business objects
- Manages the exchange of startup and administrative messages

This document contains information about the adapter framework and the connector. It refers to both of these components as the adapter. For more information about the relationship of the integration broker to the adapter, see the *System Administration Guide*.

Note: All WebSphere business integration adapters operate with an integration broker. The adapter for WebSphere Commerce operates with the InterChange Server Express integration broker, which is described in the *System Implementation Guide*.

Adapter architecture

The adapter is meta-data-driven. The adapter uses an MQ implementation of the JavaTM Message Service (JMS), an API for accessing enterprise-messaging systems.

The adapter uses WebSphere MQ queues to enable asynchronous data exchange from WebSphere Commerce to InterChange Server Express and from InterChange Server Express to WebSphere Commerce. Data is sent between the queues for WebSphere Commerce and the InterChange Server Express in the form of XML

messages. An XML data handler is used to convert the data into business objects that can be processed by InterChange Server Express collaboration objects.

For information about using the adapter in synchronous exchanges, see "Synchronous request and reply interactions" on page 3.

Asynchronous messages from WebSphere Commerce to integration broker

When an order is placed in WebSphere Commerce, an `OrderCreate` message is generated in XML format and is placed in the WebSphere MQ output queue as shown in the following figure. (In this illustration, it is assumed that WebSphere Commerce and the integration broker are installed on different machines using different queue managers, making it necessary to have a remote queue definition for output from WebSphere Commerce, connecting to an input queue that is local to the integration broker. When WebSphere Commerce and the integration broker are installed on the same machine, a single queue can function as both the output queue from WebSphere Commerce and input queue for the integration broker.)
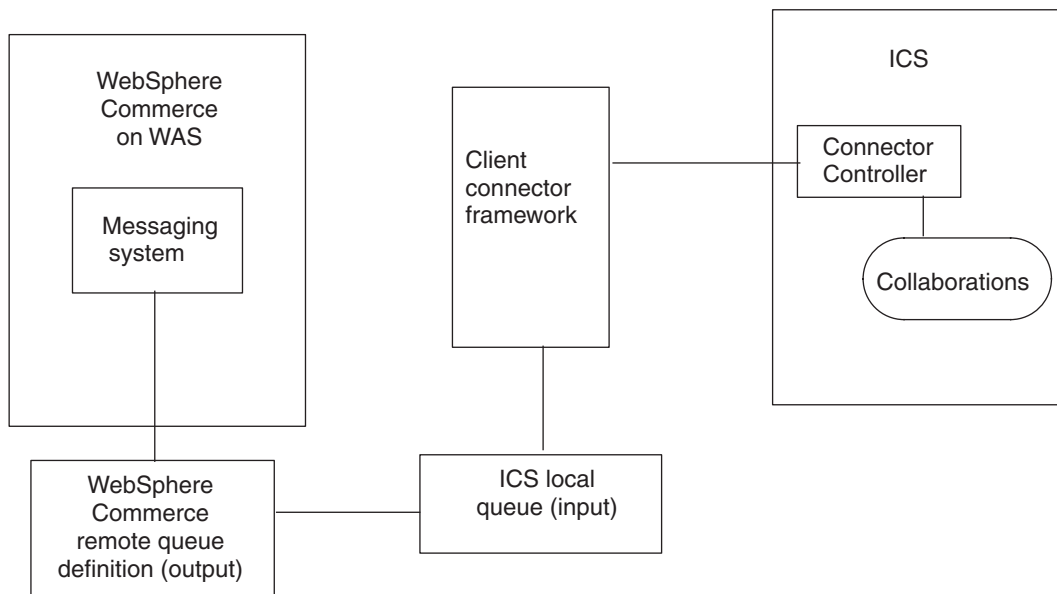
Figure 1. Adapter architecture

To detect data events in WebSphere Commerce, the adapter polls the WebSphere Commerce output queues for new XML messages. When it discovers a new message, the adapter passes it to an input queue, calls a data handler to convert the message to a business object that is specific to the structure of data originating from WebSphere Commerce, and then passes the business object to the connector in InterChange Server Express. The connector invokes maps to generate a generic business object from the WebSphere Commerce-specific business object, and then delivers the generic business object to one or more collaboration objects. After the collaboration objects have processed the business object, the generic business object is mapped to an application-specific business object, which is delivered to an adapter (such as a WebSphere Business Integration adapter for SAP) that has been configured for a back-end application.

Asynchronous messages to WebSphere Commerce from InterChange Server Express

In the opposite direction, the adapter for WebSphere Commerce receives business objects from collaborations, converts them into XML-format messages using the data handler, and then delivers the messages to the WebSphere Commerce WebSphere MQ queue.

Synchronous request and reply interactions

Synchronous request and reply interactions require additions to or customization of the WebSphere Commerce application, as described in the following topics.

Requests from WebSphere Commerce to InterChange server

With the addition of the WebSphere Commerce Enhancement Pack, available at http://www-3.ibm.com/software/webservers/commerce/epacks/v54/, you can use the adapter to set up a synchronous message flow for request and reply interactions from the WebSphere Commerce messaging system to InterChange Server or other external systems. For information about this approach, see the integration documentation for WebSphere Commerce 5.4 and the IBM WebSphere business integration system.

Requests from InterChange server to WebSphere Commerce

Note: This approach requires a customization of the commands that are executed in WebSphere Commerce when a business object comes from InterChange Server Express. The commands should retrieve the ReplyTo queue from the message, and place a reply on the queue within the ResponseTimeout interval. For information about creating and customizing commands in WebSphere Commerce, refer to the *Programmer's Guide for WebSphere Commerce, V. 5.4.*

Without using WebSphere Commerce Enhancement Pack, you can set up a simulated synchronous exchange between WebSphere Commerce and InterChange Server Express, using ReplyTo queues.

See "Synchronous delivery" on page 8, later in this guide, for more information related to this approach.

Event notification

Notification of data events that have occurred in the WebSphere Commerce application is accomplished through the polling mechanism of the adapter. The adapter can poll multiple input queues, polling each in a round-robin manner and retrieving a specified number of messages from each queue. For each message retrieved during polling, the adapter adds a dynamic child meta-object (if specified in the business object). The child meta-object values can direct the adapter to populate attributes with the format of the message as well as with the name of the input queue from which the message was retrieved.

When a message is retrieved from an input queue, the connector looks up the business object name associated with that input queue and with the FORMAT field contained in the message header. The message body, along with a new instance of the appropriate business object, is then passed to the data handler. If a business object name that is associated with the input queue and format is not found, the message body alone is passed to the data handler. If a business object is

successfully populated with message content, the connector checks to see if it is subscribed, and then delivers it to InterChange Server using the `gotApplEvents()` method.

Business objects and WebSphere MQ message header

The type of business object and verb used in processing a message is based on the `FORMAT` field contained in the WebSphere MQ message header. The adapter uses meta-object entries to determine business object name and verb. You construct a meta-object to store the business object name and verb to associate with the WebSphere MQ message header `FORMAT` field text.

You can optionally construct a dynamic meta-object that is added as a child to the business object passed to the adapter. The child meta-object values override those specified in the static meta-object that is specified for the adapter as a whole. If the child meta-object is not defined or does not define a required conversion property, the adapter, by default, examines the static meta-object for the value. You can specify one or more dynamic child meta-objects instead of, or to supplement, a single static adapter meta-object.

Application-adapter communication

The adapter makes use of IBM's WebSphere MQ implementation of the Java Message Service (JMS). JMS is an open-standard API for accessing enterprise messaging systems. It is designed to allow business applications to asynchronously send and receive business data and events.

Message request

Figure 2 illustrates a message request communication. When the `doVerbFor()` method receives a business object from a collaboration, the adapter passes the business object to the data handler. The data handler converts the business object into XML text and the adapter issues it as a message to a queue. There, the JMS layer makes the appropriate calls to open a queue session and route the message.
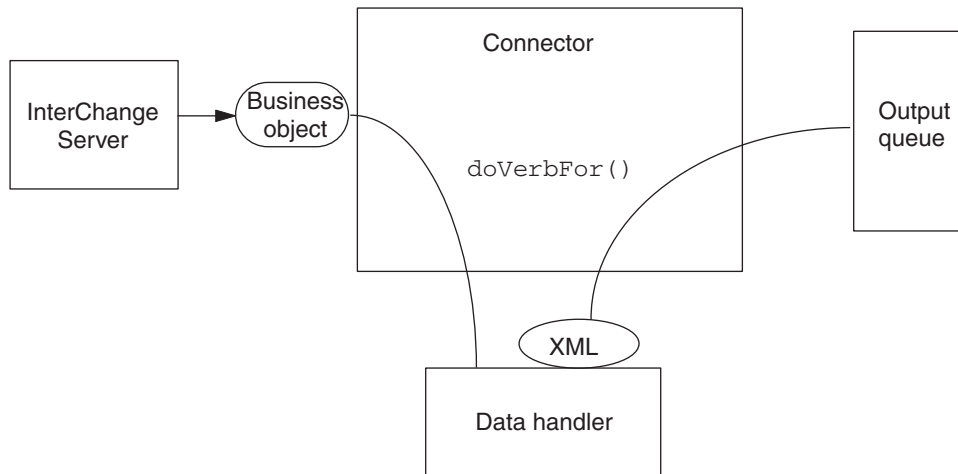

Figure 2. Application-adapter communication method: Message request

Message return

Figure 3 illustrates the message return direction. The `pollForEvents()` method retrieves the next applicable message from the input queue. The message is staged in the in-progress queue where it remains until processing is complete. Using either the static or dynamic meta-objects, the adapter first determines whether the message type is supported. If so, the adapter passes the message to the configured data handler, which converts the message into a business object. The verb that is set reflects the conversion properties established for the message type. The adapter then determines whether the business object is subscribed to by a collaboration. If so, the `gotApplEvents()` method delivers the business object to InterChange Server, and the message is removed from the in-progress queue.
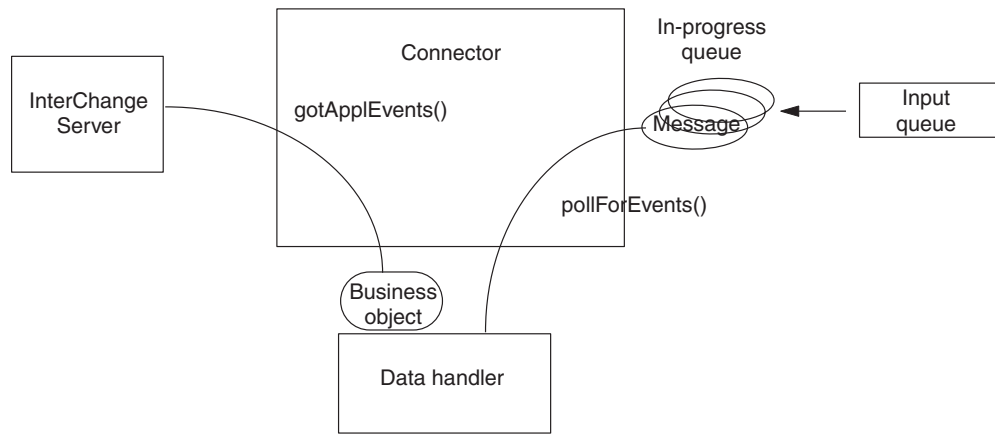
Figure 3. Application-adapter communication method: Message return

Event handling

For event notification, the adapter detects events written to a queue by WebSphere Commerce.

Retrieval

The adapter uses the `pollForEvents()` method to poll the queue at regular intervals for messages. When the adapter finds a message, it retrieves it from the queue and examines it to determine its format. If the format has been defined in the adapter's static meta-object, the adapter passes both the message body and a new instance of the business object associated with the format to the configured data handler; the data handler is expected to populate the business object and specify a verb. If the format is not defined in the static meta-object, the adapter passes only the message body to the data handler; the data handler is expected to determine, create and populate the correct business object for the message. See "Error handling" on page 56 for event failure scenarios.

The adapter processes messages by first opening a transactional session to the input queue. This transactional approach allows for a small chance that a business object could be delivered to a collaboration twice due to the adapter successfully submitting the business object but failing to commit the transaction in the queue. To avoid this problem, the adapter moves all messages to an in-progress queue. There, the message is held until processing is complete. If the adapter shuts down

unexpectedly during processing, the message remains in the in-progress queue instead of being reinstated to the original input queue.

Note: Transactional sessions with WebSphere MQ require that every requested action on a queue be performed and committed before events are removed from the queue. Accordingly, when the adapter retrieves a message from the queue, it does not commit to the retrieval until three things occur: 1) The message has been converted to a business object; 2) the business object is delivered to InterChange Server by the `gotApplEvents()` method, and 3) a return value is received.

Recovery

Upon initialization, the adapter checks the in-progress queue for messages that have not been completely processed, presumably due to a connector shutdown. The connector configuration property `InDoubtEvents` allows you to specify one of four options for handling recovery of such messages: fail on startup, reprocess, ignore, or log error.

Fail on startup

With the fail on startup option, if the adapter finds messages in the in-progress queue during initialization, it logs an error and immediately shuts down. It is the responsibility of the user or system administrator to examine the message and take appropriate action, either to delete these messages entirely or move them to a different queue.

Reprocess

With the reprocessing option, if the adapter finds any messages in the in-progress queue during initialization, it processes these messages first during subsequent polls. When all messages in the in-progress queue have been processed, the adapter begins processing messages from the input queue.

Ignore

With the ignore option, if the adapter finds any messages in the in-progress queue during initialization, the adapter ignores them, but does not shut down.

Log error

With the log error option, if the adapter finds any messages in the in-progress queue during initialization, it logs an error but does not shut down.

Archiving

If the connector property `ArchiveQueue` is specified and identifies a valid queue, the adapter places copies of all successfully processed messages in the archive queue. If `ArchiveQueue` is undefined, messages are discarded after processing. For more information on archiving unsubscribed or erroneous messages, see "Error handling" on page 56.

Note: By JMS conventions, a retrieved message cannot be issued immediately to another queue. To enable archiving and re-delivery of messages, the adapter first produces a second message that duplicates the body and the header (as applicable) of the original. To avoid conflicts with the WebSphere Commerce messaging service, only JMS-required fields are duplicated. Accordingly, the format field is the only additional message property that is copied for messages that are archived or re-delivered.

Guaranteed-event-delivery

The guaranteed-event delivery feature enables the connector framework to ensure that events are never lost and never sent twice between the connector's event store, the JMS event store, and the destination's JMS queue. To become JMS-enabled, you must configure the connector `DeliveryTransport` standard property to JMS. Thus configured, the connector uses the JMS transport and all subsequent communication between the connector and the integration broker occurs through this transport. The JMS transport ensures that the messages are eventually delivered to their destination. Its role is to ensure that once a transactional queue session starts, the messages are cached there until a commit is issued; if a failure occurs or a rollback is issued, the messages are discarded.

Note: Without use of the guaranteed-event delivery feature, a small window of possible failure exists between the time that the connector publishes an event (when the connector calls the gotApplEvent() method within its pollForEvents() method) and the time it updates the event store by deleting the event record (or perhaps updating it with an "event posted" status). If a failure occurs in this window, the event has been sent but its event record remains in the event store with an "in progress" status. When the connector restarts, it finds this event record still in the event store and sends it, resulting in the event being sent twice.

You can configure the guaranteed-event delivery feature for a JMS-enabled connector with, or without, a JMS event store. To configure the connector for guaranteed-event delivery, see "Enabling guaranteed-event delivery" on page 32.

If connector framework cannot deliver the business object to the InterChange Server Express integration broker, then the object is placed on a FaultQueue (instead of UnsubscribedQueue and ErrorQueue) and generates a status indicator and a description of the problem. FaultQueue messages are written in MQRFH2 format.

Business object requests

Business object requests are processed when InterChange Server sends a business object to the `doVerbFor()` method. Using the configured data handler, the adapter converts the business object to an WebSphere MQ message and issues it. There are no requirements regarding the type of business objects processed except those of the data handler.

Verb processing

The adapter processes business objects passed to it by a collaboration based on the verb for each business object. The adapter uses business object handlers and the `doForVerb()` method to process the business objects that the adapter supports. The adapter supports the following business object verbs:

- Create
- Update
- Delete
- Retrieve
- Exists
- Retrieve by Content

> **Note:** Business objects with Create, Update, and Delete verbs can be issued either asynchronously or synchronously. The default mode is asynchronous. The adapter does not support asynchronous delivery for business objects with the Retrieve, Exists, or Retrieve by Content verbs, Accordingly, for Retrieve, Exists, or Retrieve by Content verbs, the default mode is synchronous.

Create, update, and delete

Processing of business objects with create, update and delete verbs depends on whether the objects are issued asynchronously or synchronously.

Asynchronous delivery

The default delivery mode for business objects with create, update, and delete verbs is asynchronous. A message is created from the business object using a data handler and then written to the output queue. If the message is delivered, the adapter returns BON_SUCCESS, else BON_FAIL.

> **Note:** The adapter has no way of verifying whether the message is received or if action has been taken.

Synchronous delivery

> **Note:** This approach requires a customization of the commands that are executed in WebSphere Commerce when a business object comes from the InterChange Server Express. The commands should retrieve the `ReplyTo` queue from the message, and place a reply on the queue within the ResponseTimeout interval. For information about creating and customizing commands in WebSphere Commerce, refer to the *Programmer's Guide for WebSphere Commerce, V. 5.4*.

If a `ReplyToQueue` has been defined in the connector properties and a `ResponseTimeout` exists in the conversion properties for the business object, the adapter issues a request in synchronous mode. The adapter then waits for a response to verify that appropriate action was taken by WebSphere Commerce.

The adapter initially issues a message with a header as shown in Table 1.

Table 1. Request Message Descriptor Header (MQMD)

Field	Description	Value
Format	Format name	Output format as defined in the conversion properties and truncated to 8 characters to meet IBM requirements (example: MQSTR)
MessageType	Message Type	MQMT_DATAGRAM*
Report	Options for report message requested.	When a response message is expected, this field is populated as follows: MQRO_PAN* to indicate that a positive-action report is required if processing is successful. MQRO_NAN* to indicate that a negative-action report is required if processing fails. MQRO_COPY_MSG_ID_TO_CORREL_ID* to indicate that the correlation ID of the report generated should equal the message ID of the request originally issued.
ReplyToQueue	Name of reply queue	When a response message is expected this field is populated with the value of connector property ReplyToQueue.

Table 1. Request Message Descriptor Header (MQMD) (continued)

Field	Description	Value
Persistence	Message persistence	MQPER_PERSISTENT*
Expiry	Message lifetime	MQEI_UNLIMITED*
* Indicates constant defined by IBM.		

The message header described in Table 1 is followed by the message body. The message body is a business object that has been serialized using the data handler.

The Report field is set to indicate that both positive and negative action reports are expected from the WebSphere Commerce. The thread that issued the message waits for a response message that indicates whether WebSphere Commerce was able to process the request.

When WebSphere Commerce receives a synchronous request from the adapter, it processes the data of the business object and issues a report message as described in Table 2, Table 3, and Table 4.

Table 2. Response Message Descriptor Header (MQMD)

Field	Description	Value
Format	Format name	Input format of busObj as defined in the conversion properties.
MessageType	Message Type	MQMT_REPORT*
* Indicates constant defined by IBM.		

Table 3. Population of response message

Verb	Feedback field	Message body
Create, Update, or Delete	SUCCESS VALCHANGE	(Optional) A serialized business object reflecting changes.
	VALDUPES FAIL	(Optional) An error message.

Table 4. WebSphere MQ feedback codes and the InterChange Server Express response values

WebSphere MQ feedback code	Equivalent InterChange Server Express response
MQFB_PAN or MQFB_APPL_FIRST	SUCCESS
MQFB_NAN or MQFB_APPL_FIRST + 1	FAIL
MQFB_APPL_FIRST + 2	VALCHANGE
MQFB_APPL_FIRST + 3	VALDUPES
MQFB_APPL_FIRST + 4	MULTIPLE_HITS
MQFB_APPL_FIRST + 5	FAIL_RETRIEVE_BY_CONTENT
MQFB_APPL_FIRST + 6	BO_DOES_NOT_EXIST
MQFB_APPL_FIRST + 7	UNABLE_TO_LOGIN
MQFB_APPL_FIRST + 8	APP_RESPONSE_TIMEOUT (results in immediate termination of connector)
MQFB_NONE (this is the default if no feedback code is specified)	VALCHANGE

If the business object can be processed, the application creates a report message with the feedback field set to MQFB_PAN (or a specific InterChange Server Express

value). Optionally the application populates the message body with a serialized business object containing any changes. If the business object cannot be processed, the application creates a report message with the feedback field set to MQFB_NAN (or a specific InterChange Server Express value) and then optionally includes an error message in the message body. In either case, the application sets the correlationID field of the message to the messageID of the adapter message and issues it to the queue specified by the ReplyTo field.

Upon retrieval of a response message, the adapter matches the correlationID of the response to the messageID of a request message. The adapter then notifies the thread that issued the request. Depending on the feedback field of the response, the adapter either expects a business object or an error message in the message body. If a business object was expected but the message body is not populated, the adapter simply returns the same business object that was originally issued by InterChange Server for the Request operation. If an error message was expected but the message body is not populated, a generic error message will be returned to InterChange Server along with the response code.

Creating Custom Feedback Codes: You can extend the WebSphere MQ feedback codes to override default interpretations shown in Table 4 by specifying the connector property FeedCodeMappingMO. This property allows you to create a meta-object in which all InterChange Server Express-specific return status values are mapped to the WebSphere MQ feedback codes.

The return status assigned to a feedback code is passed to InterChange Server. For more information, see "FeedbackCodeMappingMO" on page 29.

Retrieve, exists and retrieve by content

Business objects with the retrieve, exists, and retrieve by content verbs support synchronous delivery only. The connector processes business objects with these verbs as it does for the synchronous delivery defined for create, update and delete. However, when using retrieve, exists, and retrieve by content verbs, the ResponseTimeout and ReplyToQueue are required. Furthermore, for retrieve and retrieve by content verbs, the message body must be populated with a serialized business object to complete the transaction.

Table 5 shows the response messages for these verbs.

Table 5. Population of response message

Verb	Feedback field	Message body
Retrieve or RetrieveByContent	FAIL FAIL_RETRIEVE_BY_CONTENT	(Optional) An error message.
	MULTIPLE_HITS SUCCESS	A serialized business object.
Exist	FAIL	(Optional) An error message.
	SUCCESS	

Common configuration tasks

After installing the adapter, you must configure the connector before starting it. This section provides an overview of some of the configuration and startup tasks that most developers will need to perform.

Installing the adapter

See Chapter 2, "Installing and configuring the connector," on page 15, for a description of what and where you must install.

Configuring connector properties

Connectors have two types of configuration properties: standard configuration properties and connector-specific configuration properties. Some of these properties have default values that you do not need to change. You may need to set the values of some of these properties before running the connector. For more information, see Chapter 2, "Installing and configuring the connector," on page 15.

When you configure connector properties for the adapter for WebSphere Commerce, make sure that:
* The value specified for connector property `HostName` matches that of the host of your WebSphere MQ server.
* The value specified for connector property port matches that of the port for the listener of the queue manager used by the adapter.
* The value specified for connector property channel matches the server connection channel for the queue manager used by the adapter.
* The values specified for queues match the names you used in creating the queues.
* The queue URIs for the connector properties `InputQueue`, `InProgressQueue`, `ArchiveQueue`, `ErrorQueue`, and `UnsubscribeQueue` are valid and actually exist. See Table 6.

Sending requests without notification

To configure the adapter to send requests without notification (the default asynchronous mode, also known as "fire and forget"):
* Create a business object that represents the request you want to send and is compatible with the XML data handler.
* Use either a static or a dynamic meta-object to specify the target queue and format. For more on static and dynamic meta-objects, see "Meta-objects configuration" on page 37.
* Set the property ResponseTimeout in the (static or dynamic) meta-object to -1. This forces the connector to issue the business object without checking for a return.

Sending requests and get notifications

Note: This approach requires a customization of the commands that are executed in WebSphere Commerce when a business object comes from the InterChange Server Express. The commands should retrieve the `ReplyTo` queue from the message, and place a reply on the queue within the ResponseTimeout interval. For information about creating and customizing commands in WebSphere Commerce, refer to the *Programmer's Guide for WebSphere Commerce 5.4*.

If you configure the adapter to send requests and get notifications, specify a positive ResponseTimeout value to indicate how long the adapter waits for a reply.

This approach also requires that you define a `ReplyTo` queue in the connector properties. See "Synchronous delivery" on page 8 for more information and details

about what the connector expects in a response message. If the requirements listed are not met by the response message, the connector may report errors or fail to recognize the response message. See also sections on "Meta-objects configuration" on page 37, and Chapter 3, "Working with business objects," on page 55.

Configuring a static meta-object

A static meta-object contains application-specific information that you specify about business objects and how the connector processes them. A static meta-object provides the connector with all the information it needs to process a business object when the connector is started.

If you know at implementation time which queues different business objects must be sent to, use a static meta-object. Make sure the connector subscribes to the static meta-object by specifying the name of the static meta-object in the connector-specific property `DataHandlerConfigMO`. For more information, see "Connector-specific configuration properties" on page 27..

Configuring a dynamic meta-object

If the connector is required to process a business object differently depending on the scenario, use a dynamic meta-object. This is a child object that you add to the business object. The dynamic meta-object tells the connector (at run-time) how to process a request. Unlike the static meta-object, which provides the connector with all of the information it needs to process a business object, a dynamic meta-object provides only those additional pieces of logic required to handle the processing for a specific scenario. To create and configure a dynamic meta-object:

- Create the dynamic meta-object and add it as a child to the request business object
- Program your collaboration with additional logic that populates the dynamic meta-object with information such as the target queue, message format, etc., before issuing it to the connector.

The connector will check for the dynamic meta-object and use its information to determine how to process the business object. For more information, see "Overview of creating dynamic child meta-objects" on page 44.

Configuring MQMD formats

MQMDs are message descriptors. MQMDs contain the control information accompanying application data when a message travels from one application to another. You must specify a value for the MQMD attribute OutputFormat in either your static or dynamic meta-object. For more information, see "Create, update, and delete" on page 8.

Configuring queue URIs

To configure queues for use with the connector:

- Specify all queues as Uniform Resource Identifiers (URIs). The syntax is:

  `queue://<InterChangeServerName.queue.manager>/<actual queue>`

- Specify the host for the queue manager in connector-specific configuration properties (see Table 6).
- If your target application expects an MQMD header only and cannot process the extended MQRFH2 headers used by JMS clients, append `?targetClient=1` to the queue URI. For more information, see "Queue uniform resource identifiers (URIs)" on page 36 and the WebSphere MQ programming guide.

Configuring the XML data handler

The XML data handler is required for using the adapter with WebSphere Commerce. There are two ways to configure the data handler:

- Specify the data handler class name in the connector-specific property `DataHandlerClassName`. For more information, see "Connector-specific configuration properties" on page 27.
- Specify the mime type and the data handler meta-object that defines the configuration for that mime type in the connector-specific properties `DataHandlerMimiType` and `DataHandlerConfigMO`, respectively. For more information, see Table 6 and the Data Handler Guide.

Modifying the startup script

See Chapter 2, "Installing and configuring the connector," on page 15, for a description of how to start the connector. You must configure connector properties before startup. You must also modify the startup file. Make sure you modify the `start_connector` script to point to the location of the client libraries. Do not install multiple versions of the client libraries or versions that are not up-to-date with your WebSphere MQ server. For more information, see "Startup file configuration" on page 51.

Chapter 2. Installing and configuring the connector

This chapter describes how to install and configure the adapter and enable the WebSphere Commerce application to work with the connector.

Adapter environment

Before installing, configuring, and using the adapter, you must understand its environment requirements. They are listed in the following section.
- "Adapter platforms"
- "Globalization"

Adapter platforms

This adapter is supported on the following software:

Operating systems:

One of the following application platforms:
- Windows 2003
- IBM i5/OS V5R3 and OS/400V5R2

  Note: i5/OS refers to both i5/OS and OS/400 unless explicitly stated.
- Linux:
  RedHat Enterprise Linux WS/AS/ES 3.0 Update 2, Intel (IA32)
  SuSE Linux ES 8.1 SP3, Intel (IA32)
  SuSE Linux ES 9.0, Intel (IA32)

Databases:
- DB2

Third-party software:
- WebSphere Commerce versions 5.4, 5.5, and 5.6.

Globalization

This adapter is DBCS (double-byte character set)-enabled but is not translated.

Prerequisite tasks

This section describes the installation and configuration tasks you must perform for WebSphere Commerce and other software before you can install and run the adapter.

These tasks are:
1. Install and configure WebSphere Commerce
2. Install and configure the Commerce Enhancement Pack
3. Publish a WebSphere Commerce store
4. Create and configure WebSphere MQ queues
5. Configure JMS ConnectionSpec within WebSphere Commerce
6. Update WebSphere Commerce JVM Settings
7. Enable WebSphere Commerce Adapter

Installing and configuring WebSphere Commerce

Install WebSphere Commerce version 5.4, Business Edition, with Fixpack 2, WebSphere Commerce version 5.5 with Fixpack 4, or WebSphere Commerce version 5.6. Refer to the documentation that comes with the product for the installation steps and the post-install configuration. The WebSphere Commerce messaging system is equipped to handle the messages to interact with back-end systems.

You must update the CMDREG table, which is the command registry table in your WebSphere Commerce database, to use the XML message format.

Installing the Commerce enhancement pack

To install the Commerce Enhancement Pack, download the Commerce Enhancement Pack driver from the following URL and follow the instructions in the readme.txt file:
http://www.ibm.com/software/commerce/epacks

Publishing a store

You can use this adapter with an existing WebSphere Commerce published store, or you can create a new store.

Configuring WebSphere MQ queues

The WebSphere MQ queue configuration required for using the adapter depends in part upon the topology of your WebSphere Commerce and InterChange Server Express installations. You may be using any of the following topologies:
- Single machine

  WebSphere Commerce and InterChange Server Express and the adapter are all installed on the same machine
- Two machines with two queue managers

  WebSphere Commerce is installed on one machine, and InterChange Server Express and the connector are installed on another machine. A different queue manager is used on each machine.
- Two machines with a single queue manager

  WebSphere Commerce is installed on one machine, and InterChange Server Express and the connector are installed on another machine. The same queue manager is used to manage the queues on both machines.

Single-machine topology

In this topology, WebSphere Commerce, InterChange Server Express and the adapter for WebSphere Commerce are all installed on a single machine. A single queue manager handles all the WebSphere MQ queues used in the solution. It is recommended that you use the queue manager that you set up when you installed InterChange Server Express.

This topology requires queues that perform the following roles:

- Inbound Queue

  WebSphere Commerce requires that this queue exist. However, the adapter does not make use of it in this solution.

- Parallel Inbound Queue

  WebSphere Commerce requires that this queue exist. However, the adapter does not make use of it in this solution.

- Serial Inbound Queue

  For receiving messages sent from InterChange Server Express to WebSphere Commerce.

- Outbound Queue

  For sending messages from WebSphere Commerce to InterChange Server Express.

- InProgress Queue

  The original versions of valid messages sent from WebSphere Commerce to InterChange Server Express are stored here until the adapter completes processing; when processing is completed, the original message is moved to the local Archive queue.

- Archive_Queue

  When a message has been fully processed by the adapter and sent to InterChange Server Express from WebSphere Commerce, the original version of the message is stored here.

- Unsubscribed_Queue

  If a message is successfully parsed but does not correspond to any business object supported by the adapter, it is stored here.

- ICS_Error_Queue

  If a message is not successfully converted to a business object and sent to the InterChange Server Express, it is stored here.

- WCS_Error_Queue

  Stores messages that cannot be successfully processed by WebSphere Commerce.

- ReplyTo Queue

  Used only in configurations that are set up for synchronous data exchange.

All of the above queues are local in the single machine topology. If you create the queues manually, you choose the names that you assign for them; if you use the batch file provided with this solution (described below), the batch file will create the queues with pre-assigned names.

If you are using the adapter in a Windows environment, you can use a batch file to generate queues that are appropriate for a single machine topology. The file is installed with your product package in the `\Connector\WebSphereCommerce\Utilities` subdirectory within the root directory

you used for your InterChange Server Express installation. To create the queues using the batch file, run the file `ConfigureWebSphereCommerceAdapter.bat`, as follows:

From the command prompt, enter:
```
ConfigureWebSphereCommerceAdapter
<InterChangeServerName>.queue.manager
```

Where, `<InterChangeServerName>` is the name of your InterChange Server Express.

This will create a queue manager named `InterChange ServerName.queue.manager` and it will create the required WebSphere MQ queues. The names of the created queues, as created by the batch file, are as follows:

WC_MQCONN.IN_PROGRESS In Progress queue for the adapter.

WC_MQCONN.ERROR InterChange Server Express Error Queue for the adapter.

WC_MQCONN.ARCHIVE Archive Queue for the adapter.

WC_MQCONN.REPLY Reply-To Queue for the adapter.

WC_MQCONN.UNSUBSCRIBED UnSubscribed Queue for the adapter.

WCS_Serial_Inbound Serial Inbound Queue for WebSphere Commerce. Must match a JMS queue name defined for WebSphere Commerce.

WCS_Outbound Outbound queue for WebSphere Commerce. Must match a JMS queue name defined for WebSphere Commerce.

WCS_Error Error queue for WebSphere Commerce. Must match a JMS queue name defined for WebSphere Commerce.

WCS_Inbound Inbound queue for WebSphere Commerce. Must match a JMS queue name defined for WebSphere Commerce.

Generating queues for an OS/400 environment: If you are using the queues in an i5/OS environment, you must create the queues.

Depending on your installation, there are 2 ways to create queues:
*   WebSphere Business Integration Server Express Console (if installed)
*   CL commands

Using WebSphere Business Integration Server Express Console to create queues:
1. Start the WebSphere Business Integration Server Express Console application.
2. Select **Start > Programs > IBM WebSphere Business Integration Express > Toolset Express > Administrative > Console**.
3. Enter the OS/400 system name or IP address and enter a user profile password.
    The user profile must have access to the WebSphere MQ queue, serverName.QUEUE.MANAGER, created during the installation of the Server Express component.
4. From the **InterChange Servers and Connector Agents**' tab of the console, right-click the serverName which you wish to create the queues for, and select

Configure Queue Manager. This will open a text window to allow you to define the queues for the server's queue manager.

Notepad opens to the edit file, mq_temp.tst.

5. Add the following lines to the top of the file:
   - DEFINE QLOCAL (WC_MQCONN.IN_PROGRESS) DESCR (WBI Adapter in Progress Queue)
   - DEFINE QLOCAL (WC_MQCONN.ERROR) DESCR (WBI Adapter Error Queue)
   - DEFINE QLOCAL (WC_MQCONN.ARCHIVE) DESCR (WBI Adapter Queue)
   - DEFINE QLOCAL (WC_MQCONN.REPLY) DESCR (WBI Adapter Reply-To Queue)
   - DEFINE QLOCAL (WC_MQCONN.UNSUBSCRIBED) DESCR (WBI Adapter UnSubscribed Queue)
   - DEFINE QLOCAL (WCS_Serial_Inbound) DESCR (WebSphere Commerce MQ Adapter JMS Serial Inbound Queue)
   - DEFINE QLOCAL (WCS_Outbound) DESCR (WebSphere Commerce MW Adapter JMS Outbound Queue)
   - DEFINE QL OCAL (WCS_Parallel_Inbound) DESCR (WebSphere Commerce MQ Adapter JMS Parallel Inbound Queue)
   - DEFINE QL OCAL (WCS_Error) DESCR (WebSphere Commerce MQ Adapter JMS Error Queue)
   - DEFINE QLOCAL (WCS_Inbound) DESCR (WebSphere Commerce MQ Adapter JMS Inbound Queue)

6. Click the **Create Queues** button from the window. The console creates the queues on OS/400 for you in the Queue Manager specified for the InterChange Server Express instance.

7. Save and close Notepad.

   The console creates the queues on OS/400 for you.

Using the command line to create queues: If you are using CL commands to create queues, from the command prompt, enter:

1. STRMQM MQMNAME (serverName.QUEUE.MANAGER)
2. CRTMQMQ QNAME (WC_MQCONN.IN_PROGRESS) QTYPE (*LCL) MQMNAME (serverName.QUEUE.MANAGER) TEXT (WBI Adapter In Progress Queue)
3. CRTMQMQ QNAME (WC_MQCONN.ERROR) QTYPE (*LCL) MQMNAME (serverName.QUEUE.MANAGER) TEXT (WBI Adapter Error Queue)
4. CRTMQMQ NAME (WC_MQCONN.ARCHIVE) QTYPE (*LCL) MQMNAME (serverName.QUEUE.MANAGER) TEXT (WBI Adapter Archive Queue)
5. CRTMQMQ QNAME (WC_MQCONN.REPLY) QTYPE (*LCL) MQMNAME (serverName.QUEUE.MANAGER) TEXT (WBI Adapter Reply-To Queue)
6. CRTMQMQ QNAME (WC_MQCONN.UNSUBSCRIBED) QTYPE (*LCL) MQMNAME (serverName.QUEUE.MANAGER) TEXT (WBI Adapter Unsubscribed Queue)
7. CRTMQMQ QNAME (WCS_Serial_Inbound) QTYPE (*LCL) MQMNAME (serverName.QUEUE.MANAGER) TEXT (WebSphere Commerce MQ Adapter JMS Serial Inbound Queue)
8. CRTMQMQ QNAME (WCS_Outbound) QTYPE (*LCL) MQMNAME (serverName.QUEUE.MANAGER) TEXT (WebSphere Commerce MQ Adapter JMS Outbound Queue)

9. CRTMQMQ QNAME (WCS_Parallel_Inbound) QTYPE (*LCL) MQMNAME (serverName.QUEUE.MANAGER) TEXT (WebSphere Commerce MQ Adapter JMS Parallel Inbound Queue)

10. CRTMQMQ QNAME (WCS_Error) QTYPE (*LCL) MQMNAME (serverName.QUEUE.MANAGER) TEXT (WebSphere Commerce MQ Adapter JMS Error Queue)

11. CRTMQMQ QNAME (WCS_Inbound) QTYPE (*LCL) MQMQNAME (serverName.QUEUE.MANAGER) TEXT (WebSphere Commerce MQ Adapter JMS Inbound Queue)

where the serverName is the InterChange Server Express instance (the default for OS/400 is QWBIDFT44).

Two-machine, two-Queue Manager topology

In this topology, WebSphere Commerce is installed on one machine and WebSphere Integration Server Express and the adapter for WebSphere Commerce are installed on another machine.

WebSphere MQ must be installed on each machine, and each installation uses a different queue manager. These are the queues you create on each machine.

Note: In this table, the queue names indicate the role of each queue, but you can establish different queue names, as long as you synchronize the queue names with JMS queue names used on your WebSphere Commerce system. In the table, the prefix WCS indicates a queue that is created on the machine on which the WebSphere Commerce system is installed, and that is managed by a queue manager that resides on that machine.
The prefix ICS indicates a queue that is created on the machine on which ICS and the connector are installed, and that is managed by a queue manager that resides on that machine.

Queues on the WebSphere Commerce machine	Queues on the InterChange Server Express machine
WCS_Outbound Queue	**ICS_Inbound queue**
For sending messages from WebSphere Commerce to InterChange Server Express machine. This queue is created as a remote queue definition, pointing to InterChange Server Express _Inbound on the InterChange Server Express machine as the remote queue.	For receiving messages sent from WebSphere Commerce to InterChange Server Express.
WCS_Serial Inbound queue	**ICS_Outbound queue**
For receiving messages sent from InterChange Server Express to WebSphere Commerce.	For sending messages from InterChange Server Express to WebSphere Commerce. This queue is created as a remote queue definition, pointing to WCS_Serial Inbound on the WebSphere Commerce machine as the remote queue
To InterChange Server Express	**To WebSphere Commerce**
Transmission queue from WebSphere Commerce system to InterChange Server Express.	Transmission queue from InterChange Server Express to WebSphere Commerce system.
WCS_Error_queue	**ICS_Error_queue**
Stores messages that cannot be successfully processed by WebSphere Commerce.	If a message is not successfully converted to a business object, it is stored here.

Queues on the WebSphere Commerce machine	Queues on the InterChange Server Express machine
WCS_Parallel Inbound	The adapter does not make use of a parallel inbound queue.
	ICS_InProgress queue
	The original versions of valid messages sent from WebSphere Commerce to InterChange Server Express are stored here until the adapter completes processing; when processing is completed, the original message is moved to the local Archive queue.
	ICS_Archive_queue
	When a message has been fully processed by the adapter and sent to InterChange Server Express from WebSphere Commerce, the original version of the message is stored here.
	ICS_Unsubscribed_queue
	If a message is successfully converted to a business object but does not correspond to any business object supported by the adapter, it is stored here.

To enable communication between the two systems, use channels and transmission queues.

Channels that perform the following roles must be created on each machine for this topology.

Channels On the WebSphere Commerce machine	Channels On the InterChange Server Express machine
Sender_WCS	Sender_ICS
Receiver_ICS	Receiver_WCS

Creating the channels: In the following instructions, specific server and queue manager names are specified so that they correlate the different machines and queues. Channels are used to make sure that the correct queues refer to each other; the "local" versions of the queues are used to hold the actual information.

Perform the following configuration tasks on the WebSphere Commerce machine:

Note: The channel names used here are examples only.

1. Create two channels in the WebSphere Commerce system using WebSphere MQ Explorer. One sender channel named 'WCS' and one receiver channel named 'ICS'.
2. Create a local queue, for example, using the name 'ToICSSystem'.
3. Set the ToICSSystem queue as the transmission queue.
4. Set the following properties for the WCS_Outbound queue.
   a. Remote queue name `ICS_Inbound`Remote queue manager name `ICS_server_name.queue.manager`. For example, `ICS.queue.manager`.

b. Set the transmission queue name property to 'ToICSSystem' as created in step 2.
5. To configure the sender channel do the following:
   a. Specify the connection name with the IP address and the port, for example, 9.182.12.235(1414). Where, 9.182.12.235 is the IP address of the machine where InterChange Server Express is running and 1414 is the default listener port.
   b. Specify the transmission queue name as 'ToICSSystem'.

This completes the configuration tasks for the WebSphere Commerce machine.

Perform the following configuration tasks on the InterChange Server Express machine:

1. Create two channels using WebSphere MQ Explorer: One sender channel named 'ICS' and one receiver channel named 'WCS'.

   Note: The name of the sender channel in the WebSphere business integration system must be identical to the name of the receiver channel in WebSphere Commerce. The name of the receiver channel in the WebSphere business integration system must be identical to the name of the sender channel in WebSphere Commerce.

2. Create a new local queue, for example 'ToWCSSystem'. Set the ToWCSSystem queue as the transmission queue.
3. Create a remote definition queue in the WebSphere business integration system. This remote definition queue must be used in the connector component as the output queue. Set the following properties:
   a. Remote queue name `WCS_SerialInbound`
   b. Remote queue manager name `<wcssytems_Q_manager_name>`. For example, QM_wcsfvt3.
   c. Set the transmission queue name property to 'ToWCSSystem'.
4. To configure the sender channel do the following:
   a. Specify the connection name with the IP address and the port, for example, 9.182.12.18(1414). Where, 9.182.12.18 is the IP address of the machine where WebSphere Commerce is running and 1414 is the default listener port.
   b. Specify the transmission queue name as 'TOWCSSystem'.

After you finish configuring the WebSphere MQ queues and channels on both the WebSphere Commerce machine and the InterChange Server Express machine, start the receiver channel and then the sender channel.

Two-machine, one-queue manager topology

In this topology, WebSphere Commerce is installed on one machine and InterChange Server Express and the adapter for WebSphere Commerce are installed on another machine. Only one instance of WebSphere MQ is running, and the queues used by both machines are managed by a single queue manager. This scenario uses only local queues.

This topology requires queues that perform the following roles:

- Inbound Queue

  WebSphere Commerce requires that this queue exist. However, the adapter does not make use of it in this solution.

- Serial Inbound Queue

For sending messages from InterChange Server Express to WebSphere Commerce.

- Outbound Queue

  For receiving messages sent from WebSphere Commerce to InterChange Server Express.

- InProgress Queue

  The original versions of valid messages sent from WebSphere Commerce to InterChange Server Express are stored here until the adapter completes processing; when processing is completed, the original message is moved to the local Archive queue.

- Archive_Queue

  When a message has been fully processed by the adapter and sent to InterChange Server Express from WebSphere Commerce, the original version of the message is stored here.

- Unsubscribed_Queue

  If a message is successfully parsed but does not correspond to any business object supported by the adapter, it is stored here.

- WebSphere Commerce Error Queue

- ICS_Error_Queue

  If a message is not successfully converted to a business object and sent to the InterChange Server Express, it is stored here.

- WCS_Error_Queue

  Stores messages that cannot be successfully processed by WebSphere Commerce.

- ReplyTo Queue

  Used only in configurations that are set up for synchronous data exchange.

Configuring JMS ConnectionSpec within WebSphere Commerce Version 5.4

Note: The JMSQueue names and JMS connection factory must be the same as the values entered in the `connectionSpec` section of Commerce Configuration Manager, in the instance XML file. You can find the details under the `Transports` section in the WebSphere Commerce Configuration Manager. Also see the instructions below.

Start the WebSphere Commerce Administration Console. Log in as a Site Administrator, go to the Configuration section and choose the Transport option. Select WebSphere MQ as your transport and change the status to active. Log out from the Administration Console.

The WebSphere Commerce solution requires the creation and use of a "store," as described in the *WebSphere Commerce Installation Guide.* When you have completed publishing the store as described in "Publishing a Sample Store" section of that guide, log into the Administration Console, this time as a Store Administrator, and select the store you are using. In the Configuration section, add MQ Transport to the store. An entry for this is made in the STORETRANS table.

To enable the messaging system transport adapter, launch the WebSphere Commerce Configuration Manager and do the following:

1. Select Host name -> Instance, and then open the Components folder.
2. Select TransportAdapter.

3. Select the Enable Component checkbox and click **Apply**.

Configure JMSQueue names and JMS Connection Factory with the values that you are using for the connectionSpec in this instance, as follows:

1. Select the Host Name -> Instance
2. Select Transports, then expand Outbound->JMS
3. Select the ConnectionSpec
4. Input the ConnectionFactory name created when configuring the JMS settings for WebSphere Application Server.
5. Enter the Inbound, Error, and Outbound queue names created above.
6. Click Apply.
7. Expand Inbound->JMSInbound CCF Connector-Serial
8. Select the ConnectionSpec
9. Input the ConnectionFactory Name, SerialInbound, Error and Output JMS queues.
10. Click Apply.
11. Expand Inbound-JMSInbound CCF Connector-Parallel
12. Select the ConnectionSpec
13. Input the ConnectionFactory, ParralelInbound, Error and Output JMS queues.
14. Click Apply.

Exit the Configuration Manager.

Updating WebSphere Commerce JVM settings

You must update the WebSphere Application Server Version 4.x class path for the instance, adding the additional jar file entries. To do so, open the WebSphere Application Server Advanced Administrative Console and complete the following:

1. Select the host on which you are running your WebSphere Commerce instance.
2. Select the WebSphere Administrative Domain.
3. Select Nodes.
4. Select your host name.
5. Select Application Servers.
6. Select the WebSphere Commerce Server instance_name, where instance_name is the name of your WebSphere Commerce instance.
7. Go to the JVM settings of the instance.
8. Select Add a new system property.
9. Type in the following system property:

   `name= ws.ext.dirs value=MQ_INSTALL_PATH/java/lib`

   Where MQ_INSTALL_PATH is the path where you installed WebSphere WebSphere MQ.

Enabling WebSphere MQ for the adapter

In WebSphere Commerce, use the configuration option under the Administration console to configure WebSphere Commerce to communicate with the WebSphere MQ queues for outbound and inbound messaging that you are using in your implementation of WebSphere Commerce and InterChange Server Express. See the *WebSphere Commerce Online Help* guide for additional instructions if needed.

Installing the adapter and related files

For information on installing WebSphere Business Integration Server Express adapter products, refer to the WebSphere Business Integration Server Express installation guide for Windows, for Linux, or for i5/OS. The guide is located in the WebSphere Business Integration Server Express Adapters Infocenter at the following site: http://www.ibm.com/websphere/wbiserverexpress/infocenter.

Installed file structure

The sections below describe the paths and filenames of the product after installation.

Note: WebSphere Commerce and JAVA client typically are installed in separate directories for Windows, for i5/OS, and for Linux environments. On an i5/OS system for example, WebSphere Commerce is installed by default in `/QIBM/Proddata/CommerceServerxx`, while JMS is installed in `/QIBM/Proddata/mqm/java/lib`. You may want to redirect the JAVA client install to `/var/mqm/java/lib` to avoid deletion by routine `/usr`-related system administration tasks. Likewise on Windows, WebSphere Commerce is generally installed under `\Program Files\WebSphere Commerce` and JAVA Client under `\Program Files\IBM\MQSerires\Java`. Update your classpath accordingly in the WebSphere Commerce connector startup script.

Windows file structure

The Installer copies the standard files associated with the connector into your system.

The utility installs the connector into the `ProductDir\connectors\WebSphereCommerce` directory, and adds a shortcut for the connector to the Start menu.

The table below describes the Windows file structure used by the connector, and shows the files that are automatically installed when you choose to install the connector through Installer.

Subdirectory of *ProductDir*	Description
connectors\WebSphereCommerce\CWWebSphereCommerce.jar	Contains classes used by the WebSphere Commerce connector only
connectors\WebSphereCommerce\start_WebSphereCommerce.bat	The startup script for the connector (NT/2000)
\connectors\WebsphereCommerce\start_WebSphereCommerce_service.bat	The startup script for the connector service.
connectors\messages\WebSphereCommerceConnector.txt	Message file for the connector
bin\Data\App\WebSphereCommerceConnectorTemplate	Template file for adapter definition

Note: All product path names are relative to the directory where the product is installed on your system.

Linux file structure

The Installer copies the standard files associated with the connector into your system.

The utility installs the connector into the `ProductDir/connectors/WebSphereCommerce` directory.

The table below describes the Linux file structure used by the connector, and shows the files that are automatically installed when you choose to install the connector through Installer.

Subdirectory of *ProductDir*	Description
connectors/WebSphereCommerce/CWWebSphereCommerce.jar	Contains classes used by the WebSphere Commerce connector only
connectors/WebSphereCommerce/start_WebSphereCommerce.sh	System startup script for the connector. This script is called from the generic connector manager script. When you click the Connector Configuration screen of System Manager, the installer creates a customized wrapper for this connector manager script. Use this customized wrapper to start and stop the connector.
connectors/messages/WebSphereCommerceConnector.txt	Message file for the connector
bin/Data/App/WebSphereCommerceConnectorTemplate	Template file for the adapter definition

Note: All product path names are relative to the directory where the product is installed on your system.

i5/OS file structure

The Installer copies the standard files associated with the connector into your system.

The utility installs the connector into the *ProductDir*/connectors/WebSphereCommerce directory.

For i5/OS, a fast way to start the connector is to use the Console function. For information about the console, refer to "Starting the connector" on page 52.

Subdirectory of *ProductDir*	Description
connectors/WebSphereCommerce	Contains the connector CWWebSphereCommerce.jar and start_WebSphereCommerce.sh files.
connectors/messages/WebSphereCommerceConnector.txt	Message file for the connector.
connectors/WebSphereCommerce/utilities	Contains utilties.
bin	Contains the CWConnEnv.sh file.

Note: All product path names are relative to the directory where the product is installed on your system.

Configuring the adapter

Connectors have two types of configuration properties: standard configuration properties and adapter-specific configuration properties. You must set the values of these properties before running the adapter.

You use Connector Configurator Express to configure connector properties:
- For a description of Connector Configurator Express and step-by-step procedures, see Appendix B, "Connector Configurator Express," on page 81.
- For a description of standard connector properties, see "Standard connector properties" on page 27 and Appendix A, "Standard configuration properties for connectors," on page 61.
- For a description of connector-specific properties, see "Connector-specific configuration properties" on page 27.

A connector obtains its configuration values at startup. During a runtime session, you may want to change the values of one or more connector properties. Changes to some connector configuration properties, such as AgentTraceLevel, take effect immediately. Changes to other connector properties require component restart or system restart after a change. To determine whether a property is dynamic (taking effect immediately) or static (requiring either connector component restart or system restart), refer to the Update Method column in the Connector Properties window of Connector Configurator Express.

Standard connector properties

Standard configuration properties provide information that all connectors use. See Appendix A, "Standard configuration properties for connectors," on page 61, for documentation of these properties.

Because this adapter supports only InterChange Server Express as the integration broker, the only configuration properties relevant to it are for InterChange Server Express.

Connector-specific configuration properties

Connector-specific configuration properties provide information needed by the connector at runtime. They also provide a way of changing static information or logic within the adapter without having to recode and rebuild the agent.

The following table lists the connector-specific configuration properties for the adapter. See the sections that follow for explanations of the properties.

Note: These properties include default queue name values. You will need to change these values to match the queue names you are actually using in your set up.

Table 6. Connector-specific configuration properties

Name	Possible values	Default value	Required
ApplicationPassword	*Login password*		No
ApplicationUserName	*Login user ID*		No
ArchiveQueue	*Queue to which copies of successfully processed messages are sent*	`queue://<queue_manager_name>/` `WC_MQCONN.ARCHIVE`	No
CCSID	Character set for the queue manager connection		No
Channel	*MQ server connector channel*		Yes
ConfigurationMetaObject	*Name of configuration meta-object*		Yes
DataHandlerClassName	*Data handler class name*	`com.crossworlds.DataHandlers.` `text.xml`	No
DataHandlerConfigMO	*Data handler meta-object*	`MO_DataHandler_ Default`	Yes
DataHandlerMimeType	*MIME type of file*	`text/xml`	No
DefaultVerb	Any verb supported by the connector		No
EnableMessageProducerCache	*true or false*	`true`	No
ErrorQueue	*Queue for unprocessed messages*	`queue://<queue_manager_name>/` `WC_MQCONN.ERROR`	No
FeedbackCodeMappingMO	Feedback code meta-object		No
HostName	*WebSphere MQ server*		Yes
InDoubtEvents	`FailOnStartup Reprocess` `Ignore LogError`	`Reprocess`	No

Table 6. Connector-specific configuration properties (continued)

Name	Possible values	Default value	Required
InputQueue	*Poll queues*	queue://<*queue_manager_name*>/ WC_MQCONN.IN	No
InProgressQueue	*In-progress event queue*	queue://<*queue_manager_name*>/ WC_MQCONN.IN_PROGRESS	Yes
PollQuantity	*Number of messages to retrieve from each queue specified in the InputQueue property*	1	No
Port	*Port established for the WebSphere MQ listener*		Yes
ReplyToQueue	*Queue to which response messages are delivered when the adapter issues requests*	queue://<*queue_manager_name*>/ WC_MQCONN.REPLYTO	No
SessionPoolSizeForRequests	*Maximum pool size for caching the sessions used during request processing*	10	No
UnsubscribedQueue	*Queue to which unsubscribed messages are sent*	queue://<*queue_manager_name*>/ WC_MQCONN.UNSUBSCRIBE	No
UseDefaults	true or false	false	

ApplicationPassword
Password used with `UserID` to log in to WebSphere MQ.

Default = None.

If the `ApplicationPassword` is left blank or removed, the adapter uses the default password provided by WebSphere MQ.

ApplicationUserName
User ID used with `Password` to log in to WebSphere MQ.

Default=None.

If the `ApplicationUserName` is left blank or removed, the adapter uses the default user ID provided by WebSphere MQ.

ArchiveQueue
Queue to which copies of successfully processed messages are sent.

Default = queue://<*queue_manager_name*>/WC_MQCONN.ARCHIVE

CCSID
The character set for the queue manager connection. The value of this property should match that of the CCSID property in the queue of the URI. For more information, see"Queue uniform resource identifiers (URIs)" on page 36.

Default = none.

Channel
MQ server adapter channel through which the adapter communicates with WebSphere MQ.

Default=none.

If the Channel is left blank or removed, the adapter uses the default server channel provided by WebSphere MQ.

ConfigurationMetaObject

Name of static meta-object containing configuration information for the connector.

Default = none.

DataHandlerClassName

Data handler class to use when converting messages to and from business objects.

Default = com.crossworlds.DataHandlers.text.xml

DataHandlerConfigMO

Meta-object passed to data handler to provide configuration information.

Default = MO_DataHandler_Default

DataHandlerMimeType

Allows you to request a data handler based on a particular MIME type. The XML data handler is required for use with WebSphere Commerce.

Default = text/xml

DefaultVerb

Specifies the verb to be set within an incoming business object, if it has not been set by the data handler during polling.

Default = none.

EnableMessageProducerCache

Boolean property to specify that the adapter should enable a message producer cache for sending request messages.

Default = true.

EnableMessageProducerCache

Boolean property to specify that the adapter should enable a message producer cache for sending request messages

Default = true

ErrorQueue

Queue to which messages that could not be processed are sent.

Default = queue://<*queue_manager_name*>/WC_MQCONN.ERROR

FeedbackCodeMappingMO

Allows you to override and reassign the default feedback codes used to synchronously acknowledge receipt of messages to InterChange Server. This property enables you to specify a meta-object in which each attribute name is understood to represent a feedback code. The corresponding value of the feedback code is the return status that is passed to InterChange Server. For a listing of the default feedback codes, see "Synchronous delivery" on page 8. The adapter accepts the following attribute values representing WebSphere MQ-specific feedback codes:

- MQFB_APPL_FIRST

- MQFB_APPL_FIRST_OFFSET_*N* *where N is an integer (interpreted as the value of* MQFB_APPL_FIRST + *N*)

The adapter accepts the following InterChange Server Express-specific status codes as attribute values in the meta-object:
- SUCCESS
- FAIL
- APP_RESPONSE_TIMEOUT
- MULTIPLE_HITS
- UNABLE_TO_LOGIN
- VALCHANGE
- VALDUPES

The following table shows a sample meta-object.

Table 7. Example feedback code meta-object attributes

Attribute name	Default value
MQFB_APPL_FIRST	SUCCESS
MQFB_APPL_FIRST + 1	FAIL
MQFB_APPL_FIRST + 2	UNABLE_TO_LOGIN

Default = none.

HostName
The name of the server hosting WebSphere MQ.

Default=none.

InDoubtEvents
Specifies how to handle in-progress events that are not fully processed due to unexpected adapter shutdown. Choose one of four actions to take if events are found in the in-progress queue during initialization:
- FailOnStartup. Log an error and immediately shut down.
- Reprocess. Process the remaining events first, then process messages in the input queue.
- Ignore. Disregard any messages in the in-progress queue.
- LogError. Log an error but do not shut down

Default = Reprocess.

InputQueue
Message queues that will be polled by the adapter for new messages. The adapter accepts multiple semi-colon delimited queue names. For example, to poll the following three queues: MyQueueA, MyQueueB, and MyQueueC, the value for connector configuration property *InputQueue* would equal: MyQueueA;MyQueueB;MyQueueC.

If the InputQueue property is not supplied, the connector starts up properly but prints a warning message, and performs request processing only. It will not perform any event processing.

The adapter polls the queues in a round-robin manner and retrieves up to *pollQuantity* number of messages from each queue. For example, if *pollQuantity*

equals 2, and `MyQueueA` contains 2 messages, `MyQueueB` contains 1 message and `MyQueueC` contains 5 messages, the adapter retrieves messages in the following manner:

Since we have a pollQuanity of 2, the adapter will retrieve at most two messages from each queue per call to pollForEvents. For the first cycle (1 of 2), the adapter retrieves the first message from each of MyQueueA, MyQueueB, and MyQueueC. That completes the first round of polling and if we had a pollQuantity of 1, the adapter would stop.

Since we have a pollQuanity of 2, the adapter starts a second round of polling (2 of 2) and retrieves one message each from MyQueueA and MyQueueC--it skips MqQueueB since it is now empty. After polling all queues 2x each, the call to the method pollForEvents is complete. Here's the sequence of message retrieval:

1. 1 message from `MyQueueA`
2. 1 message from `MyQueueB`
3. 1 message from `MyQueueC`
4. 1 message from `MyQueueA`
5. Skip `MyQueueB` since it's now empty
6. 1 message from `MyQueueC`

Default = queue://<*queue_manager_name*>/WC_MQCONN.IN

InProgressQueue
Message queue where messages are held during processing.

Default= queue://<*queue_manager_name*>/WC_MQCONN.IN_PROGRESS

PollQuantity
Number of messages to retrieve from each queue specified in the `InputQueue` property during a `pollForEvents` scan.

Default =1

Port
Port established for the WebSphere MQ listener.

Default=None.

ReplyToQueue
Queue to which response messages are delivered when the adapter issues requests.

Default = queue://<*queue_manager_name*>/WC_MQCONN.REPLY

SessionPoolSizeForRequests
The maximum pool size for caching the sessions used during request processing.

Default = 10

UnsubscribedQueue
Queue to which messages that are not subscribed are sent.

Default = queue://<*queue_manager_name*>/WC_MQCONN.UNSUBSCRIBED

Note: *Always check the values WebSphere MQ provides since they may be incorrect or unknown. If so, please implicitly specify values.

UseDefaults

On a Create operation, if UseDefaults is set to `true`, the connector checks whether a valid value or a default value is provided for each isRequired business object attribute. If a value is provided, the Create operation succeeds. If the parameter is set to `false`, the connector checks only for a valid value and causes the Create operation to fail if it is not provided. The default is `false`.

Enabling guaranteed-event delivery

You can configure the guaranteed-event -delivery feature for a JMS-enabled connector in one of the following ways:

- If the connector uses a JMS event store (implemented as a JMS source queue), the connector framework can manage the JMS event store. For more information, see "Guaranteed-event-delivery for connectors with JMS event stores."
- If the connector uses a non JMS event store (for example, implemented as a JDBC table, Email mailbox, or flat files), the connector framework can use a JMS monitor queue to ensure that no duplicate events occur. For more information, see "Guaranteed-event-delivery for connectors with non-JMS event stores" on page 34.

Guaranteed-event-delivery for connectors with JMS event stores

If the JMS-enabled connector uses JMS queues to implement its event store, the connector framework can act as a "container" and manage the JMS event store (the JMS source queue). In a single JMS transaction, the connector can remove a message from a source queue and place it on the destination queue. This section provides the following information about use of the guaranteed-event delivery feature for a JMS-enabled connector that has a JMS event store:

- "Enabling the feature for connectors with JMS event stores"
- "Effect on event polling" on page 34

Enabling the feature for connectors with JMS event stores

To enable the guaranteed-event delivery feature for a JMS-enabled connector that has a JMS event store, set the connector configuration properties to values shown in Table 8.

Table 8. Guaranteed-event-delivery connector properties for a connector with a JMS event store

Connector property	Value
DeliveryTransport	JMS
ContainerManagedEvents	JMS
PollQuantity	The number of events to processing in a single poll of the event store

Table 8. Guaranteed-event-delivery connector properties for a connector with a JMS event store (continued)

Connector property	Value
SourceQueue	Name of the JMS source queue (event store) which the connector framework polls and from which it retrieves events for processing **Note:** The source queue and other JMS queues should be part of the same queue manager. If the connector's application generates events that are stored in a different queue manager, you must define a remote queue definition on the remote queue manager. WebSphere MQ can then transfer the events from the remote queue to the queue manager that the JMS-enabled connector uses for transmission to the integration broker. For information on how to configure a remote queue definition, see your IBM WebSphere MQ documentation.

In addition to configuring the connector, you must also configure the data handler that converts between the event in the JMS store and a business object. This data handler information consists of the connector configuration properties that Table 9 summarizes.

Table 9. Data handler properties for guaranteed-event delivery

Data handler property	Value	Required?
MimeType	The MIME type that the data handler handles. This MIME type identifies which data handler to call.	Yes
DHClass	The full name of the Java class that implements the data handler	Yes
DataHandlerConfigMOName	The name of the top-level meta-object that associates MIME types and their data handlers	Optional

Note: The data handler configuration properties reside in the connector configuration file with the other connector configuration properties.

If you configure a connector that has a JMS event store to use guaranteed-event delivery, you must set the connector properties as described in Table 8 *and* Table 9. To set these connector configuration properties, use the Connector Configurator Express tool. Connector Configurator Express displays the connector properties in Table 8 on its Standard Properties tab. It displays the connector properties in Table 9 on its Data Handler tab.

Note: Connector Configurator Express activates the fields on its Data Handler tab only when the DeliveryTransport connector configuration property is set to JMS and ContainerManagedEvents is set to JMS.

For information on Connector Configurator Express, see Appendix B, "Connector Configurator Express," on page 81.

Effect on event polling

If a connector uses guaranteed-event delivery by setting `ContainedManagedEvents` to JMS, it behaves slightly differently from a connector that does not use this feature. To provide container-managed events, the connector framework takes the following steps to poll the event store:

1. Start a JMS transaction.

2. Read a JMS message from the event store.

   The event store is implemented as a JMS source queue. The JMS message contains an event record. The name of the JMS source queue is obtained from the `SourceQueue` connector configuration property.

3. Call the data handler to convert the event to a business object.

   The connector framework calls the data handler that has been configured with the properties in Table 9 on page 33.

4. Send the resulting message to the JMS destination queue.
   If you are using the InterChange Server Express integration broker, the message sent to the JMS destination queue is the business object. If you are using WebSphere MQ Integrator broker, the message sent to the JMS destination queue is an XML message (which the data handler generated).

5. Commit the JMS transaction.

   When the JMS transaction commits, the message is written to the JMS destination queue and removed from the JMS source queue in the same transaction.

6. Repeat step 1 through 5 in a loop. The `PollQuantity` connector property determines the number of repetitions in this loop.

Important: A connector that sets the `ContainerManagedEvents` property is set to JMS does *not* call the `pollForEvents()` method to perform event polling. If the connector's base class includes a `pollForEvents()` method, this method is *not* invoked.

Guaranteed-event-delivery for connectors with non-JMS event stores

If the JMS-enabled connector uses a non-JMS solution to implement its event store (such as a JDBC event table, Email mailbox, or flat files), the connector framework can use duplicate event elimination to ensure that duplicate events do not occur. This section provides the following information about use of the guaranteed-event delivery feature with a JMS-enabled connector that has a non-JMS event store:

- "Enabling the feature for connectors with non-JMS event stores"
- "Effect on event polling"

Enabling the feature for connectors with non-JMS event stores: To enable the guaranteed-event delivery feature for a JMS-enabled connector that has a non-JMS event store, you must set the connector configuration properties to values shown in Table 10.

Table 10. Guaranteed-event-delivery connector properties for a connector with a non-JMS event store

Connector property	Value
`DeliveryTransport`	JMS
`DuplicateEventElimination`	true

Table 10. Guaranteed-event-delivery connector properties for a connector with a non-JMS event store (continued)

Connector property	Value
MonitorQueue	Name of the JMS monitor queue, in which the connector framework stores the ObjectEventId of processed business objects

If you configure a connector to use guaranteed-event delivery, you must set the connector properties as described in Table 10. To set these connector configuration properties, use the Connector Configurator Express tool. It displays these connector properties on its Standard Properties tab. For information on Connector Configurator Express, see Appendix B, "Connector Configurator Express," on page 81.

Effect on event polling: If a connector uses guaranteed-event delivery by setting DuplicateEventElimination to true, it behaves slightly differently from a connector that does not use this feature. To provide the duplicate event elimination, the connector framework uses a JMS monitor queue to track a business object. The name of the JMS monitor queue is obtained from the MonitorQueue connector configuration property.

After the connector framework receives the business object from the application-specific component (through a call to gotApplEvent() in the pollForEvents() method), it must determine if the current business object (received from gotApplEvents()) represents a duplicate event. To make this determination, the connector framework retrieves the business object from the JMS monitor queue and compares its ObjectEventId with the ObjectEventId of the current business object:

- If these two ObjectEventIds are the same, the current business object represents a duplicate event. In this case, the connector framework ignores the event that the current business object represents; it does *not* send this event to the integration broker.
- If these ObjectEventIds are *not* the same, the business object does *not* represent a duplicate event. In this case, the connector framework copies the current business object to the JMS monitor queue and then delivers it to the JMS delivery queue, all as part of the same JMS transaction. The name of the JMS delivery queue is obtained from the DeliveryQueue connector configuration property. Control returns to the connector's pollForEvents() method, after the call to the gotApplEvent() method.

For a JMS-enabled connector to support duplicate event elimination, you must make sure that the connector's pollForEvents() method includes the following steps:

- When you create a business object from an event record retrieved from the non-JMS event store, save the event record's unique event identifier as the business object's ObjectEventId attribute.

  The application generates this event identifier to uniquely identify the event record in the event store. If the connector goes down after the event has been sent to the integration broker but before this event record's status can be changed, this event record remains in the event store with an In-Progress status. When the connector comes back up, it should recover any In-Progress events. When the connector resumes polling, it generates a business object for the event record that still remains in the event store. However, because both the business object that was already sent and the new one have the same event record as

their ObjectEventIds, the connector framework can recognize the new business object as a duplicate and not send it to the integration broker.

- During connector recovery, make sure that you process In-Progress events *before* the connector begins polling for new events.

  Unless the connector changes any In-Progress events to Ready-for-Poll status when it starts up, the polling method does not pick up the event record for reprocessing.

Queue uniform resource identifiers (URIs)

The URI for a queue begins with the sequence `queue://` followed by:

- The name of the queue manager on which the queue resides
- Another /
- The name of the queue
- Optionally, a list of name-value pairs to set the remaining queue properties.

For example, the following URI connects to queue `IN` on queue manager `<queue.manager.name>` and causes all messages to be sent as WebSphere MQ messages with priority 5.

```
queue://<queue.manager.name>/WC_MQCONN.IN?targetClient=1&priority=5
```

The following table shows property names for queue URIs.

Table 11. WebSphere Commerce-specific connector property names for queue URIs

Property name	Description	Values
expiry	Lifetime of the message in milliseconds.	0 = unlimited. positive integers = timeout (in ms).
priority	Priority of the message.	0-9, where 1 is the highest priority. A value of -1 means that the property should be determined by the configuration of the queue. A value of -2 specifies that the connector can use its own default value.
persistence	Whether the message should be 'hardened' to disk.	1 = non-persistent 2 = persistent A value of -1 means that the property should be determined by the configuration of the queue. A value of -2 specifies that the connector can use its own default value.
CCSID	Character set of the destination.	Integers - valid values listed in base WebSphere MQ documentation.
targetClient	Whether the receiving application is JMS compliant or not.	0 = JMS (MQRFH2 header) 1 = MQ (MQMD header only)

Table 11. WebSphere Commerce-specific connector property names for queue URIs (continued)

Property name	Description	Values
encoding	How to represent numeric fields.	An integer value as described in the base WebSphere MQ documentation.

The adapter has no control of the character set (CCSID) or encoding attributes of data in MQMessages. Because data conversion is applied as the data is retrieved from or delivered to the message buffer, the adapter relies upon the IBM WebSphere MQ implementation of JMS to convert data (see the IBM WebSphere MQ Java client library documentation). Accordingly, these conversions should be bi-directionally equivalent to those performed by the native WebSphere MQ API using option MQGMO_CONVERT.

The adapter has no control over differences or failures in the conversion process. The adapter can retrieve message data of any CCSID or encoding supported by WebSphere MQ without additional modifications. To deliver a message of a specific CCSID or encoding, the output queue must be a fully-qualified URI and specify values for CCSID and encoding. The adapter passes this information to WebSphere MQ, which (via the JMS API) uses the information when encoding data for MQMessage delivery.

Often, lack of support for CCSID and encoding can be resolved by downloading the most recent version of the IBM WebSphere MQ Java client library from IBM's web site. If problems specific to CCSID and encoding persist, contact Technical Support to discuss the possibility of using an alternate Java Virtual Machine to run the adapter.

Meta-objects configuration

The connector uses meta-object entries to determine which business object to associate with a message. The type of business object and verb used in processing an event message is based on the FORMAT field contained in the WebSphere MQ message header. You construct a meta-object attribute to store the business object name and verb to associate with the WebSphere MQ message header FORMAT field text. Meta-object attributes also contain message processing guidelines.

When a message is retrieved from the input queue, the connector looks up the business object name associated with the FORMAT text field. The message, along with the business object name, is then passed to the data handler. If a business object is successfully populated with message content, the connector checks to see if it is subscribed, and then delivers it to the integration broker using the gotApplEvents() method.

The connector can recognize and read two kinds of meta-objects:
- a static connector meta-object
- a dynamic child meta-object

The attribute values of the dynamic child meta-object duplicate and override those of the static meta-object.

When deciding upon which meta-object will work best for your implementation, consider the following:

- **Static meta-object**
  - Useful if all meta-data for different messages is fixed and can be specified at configuration time.
  - Limits you to specifying values by business-object type. For example, all `Customer`-type objects must be sent to the same destination.
- **Dynamic meta-object**
  - Gives business processes access to information in message headers
  - Allows business processes to change processing of messages at run-time, regardless of business type. For example, a dynamic meta-object would allow you to specify a different destination for every `Customer`-type object sent to the adapter.
  - Requires changes to the structure of supported business objects—such changes may require changes to maps and business processes.
  - Requires changes to custom data handlers.

Meta-object properties

Table 12 provides a complete list of properties supported in meta-objects. Refer to these properties when implementing meta-objects. Your meta object should have one or more of the properties shown in Table 12.

Not all properties are available in both static and dynamic meta-objects. Nor are all properties are readable from or writable to the message header. See the appropriate sections on event and request processing in Chapter 1, "Overview," on page 1, to determine how a specific property is interpreted and used by the connector.

Table 12. WebSphere Commerce adapter meta-object properties

Property name	Definable in static meta-object	Definable in dynamic meta-object	Description
CollaborationName	Yes	No	The `CollaborationName` must be specified in the application specific text of the attribute for the business object/verb combination. For example, if a user expects to handle synchronous event delivery for the business object Customer with the Create verb, the static metadata object must contain an attribute named `Customer_Create`.

The `Customer_Create` attribute must contain application specific text that includes a name-value pair. For example, `CollaborationName=MyCustomerProcessingCollab`. See the "Overview of creating static meta-objects" on page 41 section for syntax details.

Failure to do this will result in run-time errors when the connector attempts to synchronously process a request involving the Customer business object. **Note:** This property is only available for synchronous requests. |

Table 12. WebSphere Commerce adapter meta-object properties (continued)

Property name	Definable in static meta-object	Definable in dynamic meta-object	Description
DataHandlerConfigMO	Yes	Yes	Meta-object passed to data handler to provide configuration information. If specified in the static meta-object, this will override the value specified in the DataHandlerConfigMO connector property. Use this meta-object property when different data handlers are required for processing different business object types. Use the dynamic child meta-object for request processing when the data format may be dependent on the actual business data. The specified business object must be supported by the connector agent. See the description in Appendix B, "Connector Configurator Express," on page 81.
DataHandlerMimeType	Yes	Yes	Allows you to request a data handler based on a particular MIME type. If specified in the meta-object, this will override the value specified in the DataHandlerMimeType connector property. Use this meta-object property when different data handlers are required for processing different business object types. Use the dynamic child meta-object for request processing when the data format might be dependent on the actual business data. The business object specified in DataHandlerConfigMO should have an attribute that corresponds to the value of this property. See the description in Appendix B, "Connector Configurator Express," on page 81.
DataHandlerClassName	Yes	Yes	See the description in Appendix B, "Connector Configurator Express," on page 81.
InputFormat	Yes	Yes	Format or type of inbound (event) message to associate with the given business object. This value helps identify the message content and is specified by the application that generated the message. When a message is retrieved and is in this format, it is converted to the given business object, if possible. If this format is not specified for a business object, the connector does not handle subscription deliveries for the given business object. Do not set this property using default meta-object conversion properties; its value is used to match incoming messages to business objects. The field that the connector considers as defining the format in the message can be user-defined via the connector-specific property MessageFormatProperty.
OutputFormat	Yes	Yes	Format to be populated in outbound messages. If the OutputFormat is not specified, the input format is used, if available.

Table 12. WebSphere Commerce adapter meta-object properties (continued)

Property name	Definable in static meta-object	Definable in dynamic meta-object	Description
InputQueue	Yes	Yes	The input queue that the connector polls to detect new messages. This property is used to match incoming messages to business objects only. Do not set this property using default conversion properties; its value is used to match incoming messages to business objects. **Note:** The InputQueue property in the connector-specific properties defines which queues the adapter polls. This is the only property that the adapter uses to determine which queues to poll. In the static MO, the InputQueue property and the InputFormat property can serve as criteria for the adapter to map a given message to a specific business object. To implement this feature, you would use connector-specific properties to configure multiple input destinations and optionally map different data handlers to each one based on the input formats of incoming messages. For information, see "Overview of mapping data handlers to input queues" on page 42
OutputQueue	Yes	Yes	Queue to which messages derived from the given business object are delivered.
ResponseTimeout	Yes	Yes	Indicates the length of time in milliseconds to wait before timing out when waiting for a response in synchronous request processing. The connector returns SUCCESS immediately without waiting for a response if this is left undefined or with a value less than zero.
TimeoutFatal	Yes	Yes	Used in synchronous request processing to trigger the connector to return an error message if a response is not received. If this property is `True`, the connector returns APPRESPONSETIMEOUT to the broker when a response is not received within the time specified by `ResponseTimeout`. If this property is undefined or set to `False`, then on a response timeout the connector fails the request but does not terminate. Default = `False`.
DataEncoding	Yes	Yes	`DataEncoding` is the encoding to be used to read and write messages. If this property is not specified in the static meta-object, the connector tries to read the messages without using any specific encoding. `DataEncoding` defined in a dynamic child meta-object overrides the value defined in the static meta-object. The default value is `Text`. The format for the value of this attribute is `messageType[:enc]`. I.e., `Text:ISO8859_1`, `Text:UnicodeLittle`, `Text`, or `Binary`.This property is related internally to the InputFormat property: specify one and only one `DataEncoding per InputFormat`.

Below are fields mapping specifically to the JMS message header. For specific explanations, interpretation of values, and more, see the JMS API specification. JMS providers may interpret some fields differently so also check your JMS provider documentation for any deviations.

| ReplyToQueue | | Yes | Queue to which a response message for a request is to be sent. |

Table 12. WebSphere Commerce adapter meta-object properties (continued)

Property name	Definable in static meta-object	Definable in dynamic meta-object	Description
Type		Yes	Type of message. Generally user-definable, depending on JMS provider.
MessageID		Yes	Unique ID for message (JMS provider specific).
CorrelationID	Yes	Yes	Used in response messages to indicate the ID of the request message that initiated this response.
Delivery Mode	Yes	Yes	Specifies whether the message is persisted or not in the MOM system. Acceptable values: 1=non-persistent 2=persistent Other values, depending on the JMS provider, may be available.
Priority		Yes	Numeric priority of message. Acceptable values: 0 through 9 inclusive (low to high priority).
Destination		Yes	Current or last (if removed) location of message in MOM system.
Expiration		Yes	Time-to-live of message. If specified as zero, expiration is set to zero. Zero indicates to the JMS provider that the message does not expire.
Redelivered		Yes	Indicates that the JMS provider most likely attempted to deliver the message to the client earlier but receipt was not acknowledged.
Timestamp		Yes	Time message was handed off to JMS provider.
UserID		Yes	Identity of the user sending the message.
AppID		Yes	Identity of the application sending the message.
DeliveryCount		Yes	Number of delivery attempts.
GroupID		Yes	Identity of the message group.
GroupSeq		Yes	Sequence of this message in the message group specified in GroupID.
JMSProperties		Yes	See "JMS properties" on page 48.

Overview of creating static meta-objects

The WebSphere MQ adapter configuration meta-object consists of a list of conversion properties defined for different business objects. The connector supports, at most, one static meta-object at any given time. You implement a static meta-object by specifying its name for connector property ConfigurationMetaObject.

The structure of the static meta-object is such that each attribute represents a single business object and verb combination and all the meta-data associated with processing that object. The name of each attribute should be the name of the business object type and verb separated by an underscore, such as Customer_Create. The attribute application-specific information should consist of one or more semicolon-delimited name-value pairs representing the meta-data properties you want to specify for this unique object-verb combination.

Table 13. Static meta-object structure

Attribute name	Application-specific text
<business object type>_<verb>	property=value;property=value;...
<business object type>_<verb>	property=value;property=value;...

For example, consider the following meta-object:

Table 14. Sample static meta-object structure

Attribute name	Application-specific information
Customer_Create	OutputFormat=CUST;OutputDestination=QueueA
Customer_Update	OutputFormat=CUST;OutputDestination=QueueB
Order_Create	OutputFormat=ORDER;OutputDestination=QueueC

The meta-object in this example informs the connector that when it receives a request business object of type Customer with verb Create, to convert it to a message with format CUST and then to place it in destination QueueA. If the customer object instead had verb Update, the message would be placed in QueueB. If the object type was Order and had verb Create, the connector would convert and deliver it with format ORDER to QueueC. Any other business object passed to the connector would be treated as unsubscribed.

Optionally, you may name one attribute Default and assign to it one or more properties in the ASI. For all attributes contained in the meta-object, the properties of the default attribute are combined with those of the specific object-verb attributes. This is useful when you have one or more properties to apply universally (regardless of object-verb combination). In the following example, the connector would consider object-verb combinations of Customer_Create and Order_Create as having OutputDestination=QueueA in addition to their individual meta-data properties:

Table 15. Example static meta-object structure

Attribute name	Application-specific information
Default	OutputDestination=QueueA
Customer_Update	OutputFormat=CUST
Order_Create	OutputFormat=ORDER

Table 12 on page 38 describes the properties that you can specify as application-specific information in the static meta-object.

Note: If a static meta object is not specified, the connector is unable to map a given message format to a specific business object type during polling. When this is the case, the connector passes the message text to the configured data handler without specifying a business object. If the data handler cannot create a business object based on the text alone, the connector reports an error indicating that this message format is unrecognized.

Overview of mapping data handlers to input queues

You can use the InputQueue property in the application-specific information of the static meta-object to associate a data handler with an input queue. This feature is useful when dealing with multiple trading partners who have different formats and conversion requirements.

Steps for mapping data handlers to input queues

To map a data handler to an InputQueue, do the following:

1. Use connector-specific properties (see "InputQueue" on page 30) to configure one or more input queues.

2. For each input queue in the static meta-object, specify the queue manager and input queue name as well as data handler class name and mime type in the application-specific information.

For example, the following attribute in a static meta-object associates a data handler with an InputQueue named CompReceipts:

```
[Attribute]
Name = Cust_Create
Type = String
Cardinality = 1
MaxLength = 1
IsKey = false
IsForeignKey = false
IsRequired = false
AppSpecificInfo = InputQueue=://queue.manager/CompReceipts;DataHandlerClassName=
com.crossworlds.DataHandlers.WBIMB.disposition_notification;DataHandlerMimeType=
message/
disposition_notification
IsRequiredServerBound = false
[End]
```

Overloading input formats

When retrieving a message, the connector normally matches the input format to one specific business object and verb combination. The adapter then passes the business object name and the contents of the message to the data handler. This allows the data handler to verify that the message contents correspond to the business object that the user expects.

If, however, the same input format is defined for more than one business object, the connector will be unable to determine which business object the data represents before passing it to the data handler. In such cases, the adapter passes the message contents only to the data handler and then looks up conversion properties based on the business object that is generated. Accordingly, the data handler must determine the business object based on the message content alone.

If the verb on the generated business object is not set, the connector searches for conversion properties defined for this business object with any verb. If only one set of conversion properties is found, the connector assigns the specified verb. If more properties are found, the connector fails the message because it is unable to distinguish among the verbs.

An example meta-object

The meta-object shown below configures the connector to convert Customer business objects using the verb Create.

```
[BusinessObjectDefinition]
Name = MO_WebSphereCommerceConfig
Version = 3.0.0

  [Attribute]
  Name = Default
  Type = String
  MaxLength = 1
  IsKey = true
  IsForeignKey = false
  IsRequired = false
  AppSpecificInfo = OutputQueue=queue://<Queue Manager
   Name>/WCS_Serial_Inbound?targetClient=1;
     OutputFormat=MQSTR
  IsRequiredServerBound = false
```

```
          [End]
          [Attribute]
          Name = WCS_Create_WCS_Customer_Create
          Type = String
          MaxLength = 255
          IsKey = false
          IsForeignKey = false
          IsRequired = false
          AppSpecificInfo = OutputQueue=queue://<Queue Manager
           Name>/WCS_Serial_Inbound?targetClient=1;
            OutputFormat=MQSTR
          IsRequiredServerBound = false
          [End]
          [Attribute]
          Name = WCS_Report_NC_PurchaseOrder_Create
          Type = String
          MaxLength = 255
          IsKey = false
          IsForeignKey = false
          IsRequired = false
          AppSpecificInfo = InputFormat=MQSTR
          IsRequiredServerBound = false
          [End]
          [Attribute]
          Name = ObjectEventId
          Type = String
          MaxLength = 255
          IsKey = false
          IsForeignKey = false
          IsRequired = false
          IsRequiredServerBound = false
          [End]

          [Verb]
          Name = Create
          [End]

          [Verb]
          Name = Delete
          [End]

          [Verb]
          Name = Retrieve
          [End]

          [Verb]
          Name = Update
          [End]
      [End]
```

Overview of creating dynamic child meta-objects

If it is difficult or unfeasible to specify the necessary metadata through a static meta-object, the connector can optionally accept meta-data delivered at run-time for each business object instance.

Dynamic meta-objects allow you to change the meta-data used by the connector to process a business object on a per-request basis during request processing, and to retrieve information about an event message during event processing.

The connector recognizes and reads conversion properties from a dynamic meta-object that is added as a child to the top-level business object passed to the connector. The attribute values of the dynamic child meta-object duplicate the conversion properties that you can specify via the static meta-object that is used to configure the connector.

Since dynamic child meta object properties override those found in static meta-objects, if you specify a dynamic child meta-object, you need not include a connector property that specifies the static meta-object. Accordingly, you can use a dynamic child meta-object independently of the static meta-object and vice-versa.

Table 12 on page 38 describes the properties that you can specify as application-specific information in the dynamic meta-object.

The structure of the dynamic meta-object is such that each attribute represents a single metadata property and value: `meta-object property name =meta-object property value`

Note: All standard IBM WebSphere data handlers are designed to ignore this dynamic meta-object attribute by recognizing the `cw_mo_` tag. You must do the same when developing custom data handlers for use with the adapter.

Population of the dynamic child meta-object during polling

In order to provide collaborations with more information regarding messages retrieved during polling, the connector populates specific attributes of the dynamic meta-object, if already defined for the business object created.

Table Table 16 shows how a dynamic child meta-object might be structured for polling.

Table 16. Dynamic child meta-object structure for polling

Property name	Sample value
InputFormat	CUST_IN
InputQueue	MYInputQueue
OutputFormat	CxIgnore
OutputQueue	CxIgnore
ResponseTimeout	CxIgnore
TimeoutFatal	CxIgnore

As shown in Table 16, you can define additional attributes, `Input_Format` and `InputQueue`, in a dynamic child meta-object. The `Input_Format` is populated with the format of the message retrieved, while the `InputQueue` attribute contains the name of the queue from which a given message has been retrieved. If these properties are not defined in the child meta-object, they will not be populated.

Example scenario:
- The connector retrieves a message with the format `CUST_IN` from the queue `MyInputQueue`.
- The connector converts this message to a Customer business object and checks the application-specific text to determine if a meta-object is defined.
- If so, the connector creates an instance of this meta-object and populates the `InputQueue` and `InputFormat` attributes accordingly, then publishes the business object to available collaborations.

Example dynamic child meta-object

```
[BusinessObjectDefinition]
Name = MO_Sample_Config
Version = 1.0.0

  [Attribute]
  Name = OutputFormat
```

```
                    Type = String
                    MaxLength = 1
                    IsKey = true
                    IsForeignKey = false
                    IsRequired = false
                    DefaultValue = CUST
                    IsRequiredServerBound = false
                    [End]
                    [Attribute]
                    Name = OutputQueue
                    Type = String
                    MaxLength = 1
                    IsKey = false
                    IsForeignKey = false
                    IsRequired = false
                    DefaultValue = OUT
                    IsRequiredServerBound = false
                    [End]
                    [Attribute]
                    Name = ResponseTimeout
                    Type = String
                    MaxLength = 1
                    IsKey = false
                    IsForeignKey = false
                    IsRequired = false
                    DefaultValue = -1
                    IsRequiredServerBound = false
                    [End]
                    [Attribute]
                    Name = TimeoutFatal
                    Type = String
                    MaxLength = 1
                    IsKey = false
                    IsForeignKey = false
                    IsRequired = false
                    DefaultValue = false
                    IsRequiredServerBound = false
                    [End]
                    [Attribute]
                    Name = InputFormat
                    Type = String
                    MaxLength = 1
                    IsKey = true
                    IsForeignKey = false
                    IsRequired = false
                    IsRequiredServerBound = false
                    [End]
                    [Attribute]
                    Name = InputQueue
                    Type = String
                    MaxLength = 1
                    IsKey = false
                    IsForeignKey = false
                    IsRequired = false
                    IsRequiredServerBound = false
                    [End]
                    [Attribute]
                    Name = ObjectEventId
                    Type = String
                    MaxLength = 255
                    IsKey = false
                    IsForeignKey = false
                    IsRequired = false
                    IsRequiredServerBound = false
                    [End]

                    [Verb]
```

```
        Name = Create
        [End]

        [Verb]
        Name = Delete
        [End]

        [Verb]
        Name = Retrieve
        [End]

        [Verb]
        Name = Update
        [End]
[End]
[BusinessObjectDefinition]
Name = Customer
Version = 1.0.0
AppSpecificInfo = cw_mo_conn=MyConfig

    [Attribute]
    Name = FirstName
    Type = String
    MaxLength = 1
    IsKey = true
    IsForeignKey = false
    IsRequired = false
    IsRequiredServerBound = false
    [End]
    [Attribute]
    Name = LastName
    Type = String
    MaxLength = 1
    IsKey = true
    IsForeignKey = false
    IsRequired = false
    IsRequiredServerBound = false
    [End]
    [Attribute]
    Name = Telephone
    Type = String
    MaxLength = 1
    IsKey = false
    IsForeignKey = false
    IsRequired = false
    IsRequiredServerBound = false
    [End]
    [Attribute]
    Name = MyConfig
    Type = MO_Sample_Config
    ContainedObjectVersion = 1.0.0
    Relationship = Containment
    Cardinality = 1
    MaxLength = 1
    IsKey = false
    IsForeignKey = false
    IsRequired = false
    IsRequiredServerBound = false
    [End]
    [Attribute]
    Name = ObjectEventId
    Type = String
    MaxLength = 255
    IsKey = false
    IsForeignKey = false
    IsRequired = false
    IsRequiredServerBound = false
```

```
      [End]

      [Verb]
      Name = Create
      [End]

      [Verb]
      Name = Delete
      [End]

      [Verb]
      Name = Retrieve
      [End]

      [Verb]
      Name = Update
      [End]
[End]
```

JMS headers and dynamic child meta-object attributes

You can add attributes to a dynamic meta-object to gain more information about, and more control over, the message transport. This section describes these attributes and how they affect event notification and request processing.

JMS properties: Unlike other attributes in the dynamic meta-object, JMSProperties must define a single-cardinality child object. Every attribute in this child object must define a single property to be read/written in the variable portion of the JMS message header as follows:

1. The name of the attribute has no semantic value.
2. The type of the attribute should always be String regardless of the JMS property type.
3. The application-specific information of the attribute must contain two name-value pairs defining the name and format of the JMS message property to which the attribute maps. The name is user-definable. The value type must be one of the following:
   - Boolean
   - String
   - Int
   - Float
   - Double
   - Long
   - Short
   - Byte

The table below shows application-specific information properties that you must define for attributes in the JMSProperties object.

Table 17. Application-specific information for JMS property attributes

Attribute	Possible values	ASI	Comments
Name	Any valid JMS property name (valid = compatible with type defined in ASI)	name=<*JMS property name*>;type=<*JMS property type*>	Some vendors reserve certain properties to provide extended functionality. In general, users should not define custom properties that begin with JMS unless they are seeking access to these vendor-specific features.
Type	String	type=<*see comments*>	This is the type of the JMS property. The JMS API provides a number of methods for setting values in the JMS Message: setIntProperty, setLongProperty, setStringProperty, etc. The type of the JMS property specified here dictates which of these methods is used for setting the property value in the message.

In the example below, a JMSProperties child object is defined for the Customer object to allow access to the user-defined fields of the message header:

```
Customer (ASI = cw_mo_conn=MetaData)
   |-- Id
   |-- FirstName
   |-- LastName
   |-- ContactInfo
   |-- MetaData
         |-- OutputFormat = CUST
         |-- OutputDestination = QueueA
         |-- JMSProperties
               |-- RoutingCode = 123 (ASI= name=RoutingCode;type=Int)
               |-- Dept = FD (ASI= name=RoutingDept;type=String)
```

To illustrate another example, Figure 4 shows attribute JMSProperties in the dynamic meta-object and definitions for four properties in the JMS message header: ID, GID, RESPONSE and RESPONSE_PERSIST. The application-specific information of the attributes defines the name and type of each. For example, attribute ID maps to JMS property ID of type String).

Figure 4. JMS properties attribute in a dynamic meta-object

Creating multiple instances of the adapter

Creating multiple instances of a connector is in many ways the same as creating a custom connector. You can set your system up to create and run multiple instances of a connector by following the steps below. You must:

- Create a new directory for the connector instance
- Make sure you have the requisite business object definitions
- Create a new connector definition file
- Create a new start-up script

Create a new directory

- **For Windows Platforms**:

  ProductDir\connectors\connectorInstance

  If the connector has any connector-specific meta-objects, you must create a meta-object for the connector instance. If you save the meta-object as a file, create this directory and store the file here:

  ProductDir\repository\connectorInstance

  where *connectorInstance* uniquely identifies the connector instance.

  You can specify the InterChange Server Express server name as a parameter of startup.bat; an example is: start_WebSphereCommerce.bat connName serverName.

- **For i5/OS Platforms:**

  /QIBM/UserData/WBIServer44/WebShereICSName/connectors/connectorInstance

  where connectorInstance uniquely identifies the connector instance and where WebSphereICSName is the name of the Interchange Server Express instance with which the connector runs.

  If the connector has any connector-specific meta-objects, you must create a meta-object for the connector instance. If you save the meta-object as a file, create this directory and store the file here:

  /QIBM/UserData/WBIServer44/WebSphereICSName /repository/connectorInstance where WebSphereICSName is the name of the Interchange Server Express instance with which the connector runs.

- **For Linux Platforms**:
  ProductDir/connectors/connectorInstancewhere connectorInstance uniquely identifies the connector instance. If the connector has any connector-specific meta-objects, you must create a meta-object for the connector instance. if you save the meta-object as a file, create this directory and store the file here: ProductDir/repository/connectorInstance.You can specify the InterChange

Server Express servername as a parameter of connector_manager; an example is connector_manager -start connName WebSphereICSName [-cConfigFile].

Create business object definitions

If the business object definitions for each connector instance do not already exist within the project, you must create them.

1. If you need to modify business object definitions that are associated with the initial connector, copy the appropriate files and use Business Object Designer Express to import them. You can copy any of the files for the initial connector. Just rename them if you make changes to them.

2. Files for the initial connector should reside in the following directory:

   `ProductDir\repository\initialConnectorInstance`

   Any additional files you create should be in the appropriate `connectorInstance` subdirectory of `ProductDir\repository`.

Create a connector definition

You create a configuration file (connector definition) for the connector instance in Connector Configurator Express. To do so:

1. Copy the initial connector's configuration file (connector definition) and rename it.

2. Make sure each connector instance correctly lists its supported business objects (and any associated meta-objects).

3. Customize any connector properties as appropriate.

Create a start-up script

To create a startup script:

1. Copy the initial connector's startup script and name it to include the name of the connector directory:

   dirname

2. Put this startup script in the connector directory you created in "Create business object definitions."

3. (For Windows only.) Create a startup script shortcut.

4. (For Windows only.) Copy the initial connector's shortcut text and change the name of the initial connector (in the command line) to match the name of the new connector instance.

5. (For i5/OS only.) Create a job description for the connector using the information below:
   CRTDUPOBJ(QWBIWEBCSC) FROMLIB(QWBISVR44)OBJTYPE(*JOBD)TOLIB (QWBISVR44) NEWOBJ(newwebcsname) where newwebcsname is a 10-character name that you use for the job description for your new connector.

6. (For i5/OS only.) Add the new connector to the WebSphere Business Integration Server Express Console. For information about the WebSphere Business Integration Server Express Console, refer to the online help provided with the Console.

Startup file configuration

Before you start the adapter for WebSphere Commerce, you must configure the startup file.

Windows

To complete the configuration of the adapter for Windows platforms, you must modify the startup file (either `start_WebSphereCommerceAdapter.bat` or `start_WebSphereCommerce.bat,`whichever is provided with your adapter):

1. Open the `start_WebSphereCommerceAdapter.bat` file.
2. Scroll to the section beginning with "`Set the directory containing your WebSphere MQ Java client libraries`," and specify the location of your WebSphere MQ Java client libraries. The WebSphere Commerce connector can also get the path of the MQ Java client library from the MQ_LIB variable set in the CWSharedEnv.sh file.

Starting the connector

A connector must be explicitly started using its **connector start-up script**. On Windows systems the startup script should reside in the connector's runtime directory:*ProductDir*\connectors*connName*where *connName* identifies the connector.

On Linux systems the startup script should reside in the *ProductDir*/bin directory.

On i5/OS systems the startup script should reside in the `/QIBM/UserData/WBIServer44/<instance>/connectors/<ConnInstance/` with which the connector runs.

The name of the startup script depends on the operating-system platform, as Table 18 shows.

Table 18. Startup scripts for a connector

Operating system	Startup script
Linux	`connector_manager`
i5/OS	`start_connName.sh`
Windows	`start_connName.bat`

When the startup script runs, it expects by default to find the configuration file in the *ProductDir* (see the commands below). This is where you place your configuration file.

Note: You need a local configuration file if the adapter is using JMS transport.

- **Starting the connector on a Windows system:**
  - From the **Start** menu, select **Programs>IBM WebSphere Business Integration Server Express>Adapters>Connectors**. By default, the program name is "IBM WebSphere Business Integration Server Express". However, it can be customized. Alternatively, you can create a desktop shortcut to your connector.
  - From the Windows command line: start_connName connName brokerName {-cconfigFile}.
  - On Windows systems, you can configure the connector to start as a Windows service. In this case, the connector starts when the Windows system boots (for an Auto service) or when you start the service through the Windows Services window (for a Manual service).
- **Starting the connector on a Linux system**:
  - From the command line type:
    `connector_manager -start connName brokerName [-cconfigFile ]`

where *connName* is the name of the connector and *brokerName* identifies your integration broker.

– For InterChange Server Express, specify for *brokerName* the name of the InterChange Server Express instance.

- **Starting the connector on an i5/OS system**:

  – From the Windows system where the WebSphere Business Integrations Server Express Console is installed, select **IBM WebSphere Business Integration Server Express>Toolset Express>Administrative>Console**. Then specify the OS/400 or i5/OS system name or IP address and a user profile and password that has *JOBCTL special authority. Select the connector from the list of connectors, and click Start

  – To automatically start the adapter using the Console, use the submit_adapter.sh script. This is the only way the adapter will start using the subsystem within the autostart job entry for the server.

  – In Batch mode, from the i5/OS command line, you need to run the CL command QSH and from the QSHELL environment. Run /QIBM/ProdData/WBIServer44/bin/submit_adapter.sh *connName WebSphereICSName pathToConnNameStartScript jobDescriptionName*, where *connName* is the connector name, *WebSphereICSName* is the Interchange Server Express server name (default is QWBIDFT44), *pathToConnNameStartScript* is the full path to the connector start script, *jobDescriptionName* is the name of the job description to use in the QWBISVR44 library.

  – In interactive mode, you need to run the CL command QSH and from the QSHELL environment. Run /QIBM/UserData/WBIServer44/WebSphereICSName/connectors/connName/start_connName.sh connNameWebsphereICSName [-cConfigFile] where *connName* is the name of your connector and *WebSphereICSName* is the name of the InterChange Server Express instance.

  For more information on how to start a connector, including the command-line startup options, refer to the *System Administration Guide*.

Stopping the connector

The way to stop a connector depends on the way that the connector was started.

- **Windows**:

  – You can invoke the startup script which creates a separate "console" window for the connector. In this window, type "q" and press Enter to stop the connector.

  – You can configure the connector to start as a Windows service. In this case, the connector stops when the Windows system shuts down.

- **Linux**:

  Connectors run in the background so they have no separate window. Instead, run the following command to stop the connector:

  ```
  connector_manager -stop connName
  ```

  where *connName* is the name of the connector.

- **i5/OS**:

  – If you started the connector using the Console, or using the "submit_adapter.sh" script in QSHELL, then you can use one of two methods to stop the connector:

  – From the Windows system where the WebSphere Business Integration Server Express Console is installed, select IBM **WebSphere Business Integration**

Express>Toolset Express>Administrative>Console. Then specify the OS/400 or i5/OS system name or IP address and a user profile and password that has *JOBCTL special authority. Select the WebSphere Commerce adapter from the list and select the Stop button. Use the CL Command WRKSBMJOB (QWBISVR44) to display the jobs to the Server Express Product. Scroll the list to find the job with the jobname that matches the job description for the connector. For example, for the WebSphere Commerce connector the jobname is QWBIWEBCSC. Select Option 4 on this job, and press F4 to get the prompt for the ENDJOB command. Then specify *IMMED for the Option parameter and press enter.

Note: The connector will end when the QWBISVR44 subsystem has ended.

– If you used the start_connName.sh script to start the adapter from QSHELL, press F3 to end the connector. You can also stop the agent, by using a script named *stop_adapter.sh* located in the /QIBM/ProdData/WBIServer44/bin directory.

Chapter 3. Working with business objects

This chapter describes how the adapter processes business objects and describes the assumptions that the connector makes. You can use this information as a guide to implement new business objects.

This chapter also describes how the adapter processes business objects and describes the assumptions the connector makes. You can use this information as a guide to implementing new business objects.

The adapter comes with some example business objects only. The systems integrator, consultant, or customer must build your specific business objects.

The sample business objects are contained under the /samples directory in your delivered adapter package.

The adapter is metadata-driven. In this context, metadata is data about the application, which is stored in a business object definition and which helps the adapter interact with an application. A metadata-driven connector handles each business object that it supports based on metadata encoded in the business object definition rather than on instructions hard-coded in the connector.

Business object metadata includes the structure of a business object, the settings of its attribute properties, and the content of its application-specific text. Because the connector is metadata-driven, it can handle new or modified business objects without requiring modifications to the adapter code. However, the adapter's configured data handler makes assumptions about the structure of its business objects, object cardinality, the format of the application-specific text, and the database representation of the business object. Therefore, when you create or modify a business object for the adapter, your modifications must conform to the rules the adapter is designed to follow, or it cannot process new or modified business objects correctly.

Business object structure

After installing the adapter, you must create business objects.

The adapter for WebSphere Commerce retrieves WebSphere MQ messages from a queue and attempts to populate business objects (defined by the meta-object) with the business data contained in the message.

The business data in the MQ Series messages exchanged by the adapter is contained within XML documents. The adapter uses an XML data handler to convert the data from the XML documents into business objects, and from business objects into XML documents.

The structure of the business object definitions must conform to the requirements of the XML data handler. For information about these requirements, and for instructions on how to use XML DTDs and the Edifecs SpecBuilder utility to

translate a DTD into a business object definition, refer to the IBM WebSphere Business Integration *Data Handler for XML.*

To see the properties and structure used in a typical Customer_Create business object definition for WebSphere Commerce, open the file /connector/WebSphereCommerce/samples/WC_BODefinition.in.

Error handling

All error messages generated by the adapter are stored in a message file named WebSphereCommerce.txt. (The name of the file is determined by the LogFileName standard connector configuration property.) Each error has an error number followed by the error message:

Message number
Message text

The adapter handles specific errors as described in the following sections.

Application timeout

The error message BON_APPRESPONSETIMEOUT is returned when:

- The adapter cannot establish a connection to WebSphere MQ during message retrieval.
- The connector successfully converts a business object to a message but cannot deliver it the outgoing queue due to connection loss.
- The adapter issues a message but times out waiting for a response for a business object with conversion property TimeoutFatal equal to True.
- The adapter receives a response message with a return code equal to APP_RESPONSE_TIMEOUT or UNABLE_TO_LOGIN.

Unsubscribed business object

If the adapter retrieves a message that is associated with an unsubscribed business object, the adapter delivers a message to the queue specified by the UnsubscribedQueue property.

Note: If the UnsubscribedQueue is not defined, unsubscribed messages will be discarded.

Data handler conversion

If the data handler fails to convert a message to a business object, or if a processing error occurs that is specific to the business object (as opposed to WebSphere MQ), the message is delivered to the queue specified by ErrorQueue. If the ErrorQueue is not defined, messages that cannot be processed due to errors will be discarded.

If the data handler fails to convert a business object to a message, BON_FAIL is returned.

Tracing

Tracing is an optional debugging feature you can turn on to closely follow adapter behavior. Trace messages, by default, are written to STDOUT. See the connector configuration properties for more on configuring trace messages. For more information on tracing, including how to enable and set it, see the *Connector Development Guide*.

What follows is recommended content for trace messages.

Level 0
: This level is used for trace messages that identify the adapter version.

Level 1
: Use this level for trace messages that provide key information on each business object processed or record each time a polling thread detects a new message in an input queue.

Level 2
: Use this level for trace messages that log each time a business object is posted to InterChange Server, either from `gotApplEvent()` or `executeCollaboration()`.

Level 3
: Use this level for trace messages that provide information regarding message-to-business-object and business-object-to-message conversions or provide information about the delivery of the message to the output queue.

Level 4
: Use this level for trace messages that identify when the adapter enters or exits a function.

Level 5
: Use this level for trace messages that indicate adapter initialization, represent statements executed in the application, indicate whenever a message is taken off of or put onto a queue, or record business object dumps.

Chapter 4. Troubleshooting

- "Startup problems"
- "Event processing"
- "Business object size limitation" on page 60

This chapter describes problems that you may encounter when starting up or running the adapter.

Startup problems

Problem	Potential solution / explanation
The adapter shuts down unexpectedly during initialization and the following message is reported: `Exception in thread "main" java.lang.NoClassDefFoundError: javax/jms/JMSException...`	Adapter cannot find file `jms.jar` from the IBM WebSphere MQ Java client libraries. Ensure that variable `MQSERIES_JAVA_LIB` in `start_connector.bat` points to the IBM WebSphere MQ Java client library folder.
The adapter shuts down unexpectedly during initialization and the following message is reported: `Exception in thread "main" java.lang.NoClassDefFoundError: com/ibm/mq/jms/MQConnectionFactory...`	Adapter cannot find file `com.ibm.mqjms.jar` from the IBM WebSphere MQ Java client libraries. Ensure that variable `MQSERIES_JAVA_LIB` in `start_connector.bat` points to the IBM WebSphere MQ Java client library folder.
The adapter shuts down unexpectedly during initialization and the following message is reported: `Exception in thread "main" java.lang.NoClassDefFoundError: javax/naming/Referenceable...`	Adapter cannot find file `jndi.jar` from the IBM WebSphere MQ Java client libraries. Ensure that variable `MQSERIES_JAVA_LIB` in `start_connector.bat` points to the IBM WebSphere MQ Java client library folder.
The adapter shuts down unexpectedly during initialization and the following exception is reported: `java.lang.UnsatisfiedLinkError: no mqjbnd01 in shared library path`	Adapter cannot find a required run-time library (`mqjbnd01.dll` [NT] or `libmqjbnd01.so` [Solaris]) from the IBM WebSphere MQ Java client libraries. Ensure that your path includes the IBM WebSphere MQ Java client library folder.
The adapter reports `MQJMS2005: failed to create MQQueueManager for ':'`	Explicitly set values for the following properties: `HostName`, `Channel`, and `Port`.

The adapter reports that classes could not be found.	Verify that the following directories are included in the paths for the classes:
	
	`<MQSeries Install>\java]lib`
	
	`<install_path>\bin`

The adapter hangs on startup	Verify that the WebSphere MQ listener is running.

Event processing

Problem	Potential solution / explanation
The adapter delivers all messages with an MQRFH2 header.	To deliver messages with only the MQMD WebSphere MQ header, append `?targetClient=1` to the name of output queue URI. For example, if you output messages to queue `queue://my.queue.manager/OUT`, change the URI to `queue://my.queue.manager/OUT?targetClient=1`. See Chapter 2, "Installing and configuring the connector," on page 15, for more information.

Problem	Potential solution / explanation
The adapter truncates all message formats to 8-characters upon delivery regardless of how the format has been defined in the adapter meta-object.	This is a limitation of the WebSphere MQ MQMD message header and not the adapter.

Business object size limitation

There are fundamental limitations to the Java Virtual Machine upon which the InterChange Server Express runs.

The reasons for these recommendations are as follows:

- As business objects propagate through the InterChange Server Express additional references are added to it, expanding the size of the initial business object as it progresses from ASBO to GBO.
- Additional overhead is required when transactional behavior is required, also adding to business object size. This overhead is required for persistence and flexibility of handling the varied business logic that is performed upon business objects within InterChange Server Express.

Note: Large objects for the JVM (> 20 MB) lead to excessive heap fragmentation and the inability to allocate enough memory, leading to `java.lang.OutOfMemory` errors, which cause InterChange Server Express to shut itself down.

Appendix A. Standard configuration properties for connectors

This appendix describes the standard configuration properties for the connector component of WebSphere Business Integration Server Express adapters. The information covers InterChange Server Express.

For information about properties specific to this connector, see the relevant section in this guide.

New properties

These standard properties have been added in this release:
- AdapterHelpName
- ControllerEventSequencing
- jms.ListenerConcurrency
- jms.TransportOptimized
- TivoliTransactionMonitorPerformance

Standard connector properties overview

Connectors have two types of configuration properties:
- Standard configuration properties, which are used by the framework
- Application, or connector-specific, configuration properties, which are used by the agent

These properties determine the adapter framework and the agent run-time behavior.

This section describes how to start Connector Configurator Express and describes characteristics common to all properties. For information on configuration properties specific to a connector, see its adapter user guide.

Starting Connector Configurator Express

You configure connector properties from Connector Configurator Express, which you access from System Manager. For more information on using Connector Configurator Express, refer to the sections on Connector Configurator Express in this guide.

Connector Configurator Express and System Manager run only on the Windows system. If you are running the connector on a Linux system, you must have a Windows machine with these tools installed.

To set connector properties for a connector that runs on Linux, you must start up System Manager on the Windows machine, connect to the Linux integration broker, and bring up Connector Configurator Express for the connector.

Configuration property values overview

The connector uses the following order to determine a property's value:

1. Default

2. Repository for InterChange Server Express integration broker.
3. Local configuration file
4. Command line

The default length of a property field is 255 characters. There is no limit on the length of a STRING property type. The length of an INTEGER type is determined by the server on which the adapter is running.

A connector obtains its configuration values at startup. If you change the value of one or more connector properties during a run-time session, the property's update method determines how the change takes effect.

The update characteristics of a property, that is, how and when a change to the connector properties takes effect, depend on the nature of the property.

There are four update methods for standard connector properties:

- **Dynamic**
  The new value takes effect immediately after the change is saved in System Manager. However, if the connector is in stand-alone mode (independently of System Manager).
- **Agent restart (InterChange Server Express only)**
  The new value takes effect only after you stop and restart the connector agent.
- **Component restart**
  The new value takes effect only after the connector is stopped and then restarted in System Manager. You do not need to stop and restart the agent or the server process.
- **System restart**
  The new value takes effect only after you stop and restart the connector agent and the server.

To determine how a specific property is updated, refer to the **Update Method** column in the Connector Configurator Express window, or see the Update Method column in Table 19 on page 63.

There are three locations in which a standard property can reside. Some properties can reside in more than one location.

- **ReposController**
  The property resides in the connector controller and is effective only there. If you change the value on the agent side, it does not affect the controller.
- **ReposAgent**
  The property resides in the agent and is effective only there. A local configuration can override this value, depending on the property.
- **LocalConfig**
  The property resides in the configuration file for the connector and can act only through the configuration file. The controller cannot change the value of the property, and is not aware of changes made to the configuration file unless the system is redeployed to update the controller explicitly.

Standard properties quick-reference

Table 19 provides a quick-reference to the standard connector configuration properties. Not all connectors require all of these properties, and property settings may differ. .

See the section following the table for a description of each property.

Note: In the Notes column in Table 19, the phrase "RepositoryDirectory is set to <REMOTE>" indicates that the broker is InterChange Server Express.

Table 19. Summary of standard configuration properties

Property name	Possible values	Default value	Update method	Notes
AdapterHelpName	One of the valid subdirectories in <ProductDir>\bin\Data\ App\Help that has a valid <Regional Setting> directory	Template name, if valid, or blank field	Component restart	Supported regional settings. Include `chs_chn`, `cht_twn`, `deu_deu`, `esn_esp`, `fra_fra`, `ita_ita`, `jpn_jpn`, `kor_kor`, `ptb_bra`, and `enu_usa` (default).
AdminInQueue	Valid JMS queue name	`<CONNECTORNAME>` `/ADMININQUEUE`	Component restart	This property is valid only when the value of DeliveryTransport is JMS
AdminOutQueue	Valid JMS queue name	`<CONNECTORNAME>` `/ADMINOUTQUEUE`	Component restart	This property is valid only when the value of DeliveryTransport is JMS
AgentConnections	1 through 4	1	Component restart	This property is valid only when the value of DeliveryTransport is MQ or IDL, the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
AgentTraceLevel	0 through 5	0	Dynamic for ICS; otherwise Component restart	
ApplicationName	Application name	The value specified for the connector application name	Component restart	
BrokerType	ICS	ICS	Component restart	
CharacterEncoding	Any supported code. The list shows this subset: `ascii7, ascii8, SJIS, Cp949, GBK, Big5, Cp297, Cp273, Cp280, Cp284, Cp037, Cp437` .	`ascii7`	Component restart	This property is valid only for C++ connectors.
CommonEventInfrastructure	`true` or `false`	`false`	Component restart	

Table 19. Summary of standard configuration properties (continued)

Property name	Possible values	Default value	Update method	Notes
CommonEventInfrastructureURL	A URL string, for example, `corbaloc:iiop:host:2809`.	No default value.	Component restart	This property is valid only if the value of CommonEvent Infrastructure is `true`.
ConcurrentEventTriggeredFlows	1 through 32,767	1	Component restart	This property is valid only if the value of RepositoryDirectory is set to <REMOTE> and the value of BrokerType is ICS.
ContainerManagedEvents	Blank or JMS	Blank	Component restart	This property is valid only when the value of Delivery Transport is JMS.
ControllerEventSequencing	true or false	true	Dynamic	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
ControllerStoreAndForwardMode	true or false	true	Dynamic	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
ControllerTraceLevel	0 through 5	0	Dynamic	This property is valid only if the value of RepositoryDirectory is set to <REMOTE> and the value of BrokerType is ICS.
DeliveryQueue	Any valid JMS queue name	`<CONNECTORNAME>/DELIVERYQUEUE`	Component restart	This property is valid only when the value of Delivery Transport is JMS.
DeliveryTransport	IDL or JMS	IDL when the value of RepositoryDirectory is <REMOTE>, otherwise JMS	Component restart	If the value of RepositoryDirectory is not <REMOTE>, the only valid value for this property is JMS.
DuplicateEventElimination	true or false	false	Component restart	This property is valid only if the value of DeliveryTransport is JMS.
EnableOidForFlowMonitoring	true or false	false	Component restart	This property is valid only if the value of BrokerType is ICS.
FaultQueue	Any valid queue name.	`<CONNECTORNAME>/FAULTQUEUE`	Component restart	This property is valid only if the value of DeliveryTransport is JMS.
jms.FactoryClassName	`CxCommon.Messaging.jms.IBMMQSeriesFactory`, `CxCommon.Messaging.jms.SonicMQFactory`, or any Java class name	`CxCommon.Messaging.jms.IBMMQSeriesFactory`	Component restart	This property is valid only if the value of DeliveryTransport is JMS.

Table 19. Summary of standard configuration properties (continued)

Property name	Possible values	Default value	Update method	Notes
jms.ListenerConcurrency	1 through 32767	1	Component restart	This property is valid only if the value of jms.TransportOptimized is `true`.
jms.MessageBrokerName	If the value of jms.FactoryClassName is IBM, use `crossworlds.queue. manager`.	`crossworlds.queue. manager`	Component restart	This property is valid only if the value of DeliveryTransport is JMS .
jms.NumConcurrent Requests	Positive integer	10	Component restart	This property is valid only if the value of DeliveryTransport is JMS .
jms.Password	Any valid password		Component restart	This property is valid only if the value of DeliveryTransport is JMS .
jms.TransportOptimized	`true` or `false`	`false`	Component restart	This property is valid only if the value of DeliveryTransport is JMS and the value of BrokerType is ICS.
jms.UserName	Any valid name		Component restart	This property is valid only if the value of Delivery Transport is JMS.
JvmMaxHeapSize	Heap size in megabytes	128m	Component restart	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
JvmMaxNativeStackSize	Size of stack in kilobytes	128k	Component restart	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
JvmMinHeapSize	Heap size in megabytes	1m	Component restart	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
ListenerConcurrency	1 through 100	1	Component restart	This property is valid only if the value of DeliveryTransport is MQ.
Locale	This is a subset of the supported locales: en_US, ja_JP, ko_KR, zh_CN, zh_TW, fr_FR, de_DE, it_IT, es_ES, pt_BR	en_US	Component restart	

Table 19. Summary of standard configuration properties (continued)

Property name	Possible values	Default value	Update method	Notes
LogAtInterchangeEnd	true or false	false	Component restart	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
MaxEventCapacity	1 through 2147483647	2147483647	Dynamic	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
MessageFileName	Valid file name	InterchangeSystem.txt	Component restart	
MonitorQueue	Any valid queue name	<CONNECTORNAME> /MONITORQUEUE	Component restart	This property is valid only if the value of DuplicateEventElimination is true and ContainerManagedEvents has no value.
OADAutoRestartAgent	true or false	false	Dynamic	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
OADMaxNumRetry	A positive integer	1000	Dynamic	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
OADRetryTimeInterval	A positive integer in minutes	10	Dynamic	This property is valid only if the value of Repository Directory is set to <REMOTE> and the value of BrokerType is ICS.
PollEndTime	HH = 0 through 23 MM = 0 through 59	HH:MM	Component restart	
PollFrequency	A positive integer (in milliseconds)	10000	Dynamic if broker is ICS; otherwise Component restart	
PollQuantity	1 through 500	1	Agent restart	This property is valid only if the value of ContainerManagedEvents is JMS.
PollStartTime	HH = 0 through 23 MM = 0 through 59	HH:MM	Component restart	
RepositoryDirectory	<REMOTE> if the broker is ICS; otherwise any valid local directory.	For ICS, the value is set to <REMOTE>	Agent restart	
RequestQueue	Valid JMS queue name	<CONNECTORNAME> /REQUESTQUEUE	Component restart	This property is valid only if the value of DeliveryTransport is JMS

Table 19. Summary of standard configuration properties (continued)

Property name	Possible values	Default value	Update method	Notes
ResponseQueue	Valid JMS queue name	`<CONNECTORNAME>` `/RESPONSEQUEUE`	Component restart	This property is valid only if the value of DeliveryTransport is JMS.
RestartRetryCount	0 through 99	3	Dynamic if ICS; otherwise Component restart	
RestartRetryInterval	A value in minutes from 1 through 2147483647	1	Dynamic if ICS; otherwise Component restart	
RHF2MessageDomain	`mrm` or `xml`	`mrm`	Component restart	This property is valid only if the value of DeliveryTransport is JMS and the value of WireFormat is CwXML.
SourceQueue	Any valid WebSphere MQ queue name	`<CONNECTORNAME>` `/SOURCEQUEUE`	Agent restart	This property is valid only if the value of ContainerManagedEvents is JMS.
SynchronousRequest Queue	Any valid queue name.	`<CONNECTORNAME>` `/SYNCHRONOUSREQUEST` `QUEUE`	Component restart	This property is valid only if the value of DeliveryTransport is JMS.
SynchronousRequest Timeout	0 to any number (milliseconds)	0	Component restart	This property is valid only if the value of DeliveryTransport is JMS.
SynchronousResponse Queue	Any valid queue name	`<CONNECTORNAME>` `/SYNCHRONOUSRESPONSE` `QUEUE`	Component restart	This property is valid only if the value of DeliveryTransport is JMS.
TivoliMonitorTransaction Performance	`true` or `false`	`false`	Component restart	
WireFormat	`CwXML` or `CwBO`	`CwXML`	Agent restart	The value of this property must be CwXML if the value of RepositoryDirectory is not set to <REMOTE>. The value must be CwBO if the value of RepositoryDirectory is set to <REMOTE>.
WsifSynchronousRequest Timeout	0 to any number (milliseconds)	0	Component restart	This property is not valid if the value of BrokerType is ICS..
XMLNameSpaceFormat	`short` or `long`	`short`	Agent restart	This property is not valid if the value of BrokerType is ICS.

Standard properties

This section describes the standard connector configuration properties.

AdapterHelpName

The AdapterHelpName property is the name of a directory in which connector-specific extended help files are located. The directory must be located in *<ProductDir>*\bin\Data\App\Help and must contain at least the language directory enu_usa. It may contain other directories according to locale.

The default value is the template name if it is valid, or it is blank.

AdminInQueue

The AdminInQueue property specifies the queue that is used by the integration broker to send administrative messages to the connector.

The default value is `<CONNECTORNAME>`/ADMININQUEUE

AdminOutQueue

The AdminOutQueue property specifies the queue that is used by the connector to send administrative messages to the integration broker.

The default value is `<CONNECTORNAME>`/ADMINOUTQUEUE

AgentConnections

The AgentConnections property controls the number of ORB (Object Request Broker) connections opened when the ORB initializes.

The default value of this property is 1.

AgentTraceLevel

The AgentTraceLevel property sets the level of trace messages for the application-specific component. The connector delivers all trace messages applicable at the tracing level set and lower.

The default value is `0`.

ApplicationName

The ApplicationName property uniquely identifies the name of the connector application. This name is used by the system administrator to monitor the integration environment. This property must have a value before you can run the connector.

The default is the name of the connector.

BrokerType

The BrokerType property identifies the integration broker type that you are using. The value is `ICS`.

CharacterEncoding

The CharacterEncoding property specifies the character code set used to map from a character (such as a letter of the alphabet, a numeric representation, or a punctuation mark) to a numeric value.

Note: Java-based connectors do not use this property. C++ connectors use the value `ascii7` for this property.

By default, only a subset of supported character encodings is displayed. To add other supported values to the list, you must manually modify the \Data\Std\stdConnProps.xml file in the product directory (<*ProductDir*>). For more information, see the Connector Configurator Express appendix in this guide.

ConcurrentEventTriggeredFlows

The ConcurrentEventTriggeredFlows property determines how many business objects can be concurrently processed by the connector for event delivery. You set the value of this attribute to the number of business objects that are mapped and delivered concurrently. For example, if you set the value of this property to 5, five business objects are processed concurrently.

Setting this property to a value greater than 1 allows a connector for a source application to map multiple event business objects at the same time and deliver them to multiple collaboration instances simultaneously. This speeds delivery of business objects to the integration broker, particularly if the business objects use complex maps. Increasing the arrival rate of business objects to collaborations can improve overall performance in the system.

To implement concurrent processing for an entire flow (from a source application to a destination application), the following properties must configured:
- The collaboration must be configured to use multiple threads by setting its `Maximum number of concurrent events` property high enough to use multiple threads.
- The destination application's application-specific component must be configured to process requests concurrently.

The ConcurrentEventTriggeredFlows property has no effect on connector polling, which is single-threaded and is performed serially.

This property is valid only if the value of the RepositoryDirectory property is set to <REMOTE>.

The default value is 1.

ContainerManagedEvents

The ContainerManagedEvents property allows a JMS-enabled connector with a JMS event store to provide guaranteed event delivery, in which an event is removed from the source queue and placed on the destination queue as one JMS transaction.

When this property is set to JMS, the following properties must also be set to enable guaranteed event delivery:
- PollQuantity = 1 to 500
- SourceQueue = /SOURCEQUEUE

You must also configure a data handler with the MimeType and DHClass (data handler class) properties. You can also add DataHandlerConfigMOName (the meta-object name, which is optional). To set those values, use the **Data Handler** tab in Connector Configurator Express.

Although these properties are adapter-specific, here are some example values:
- MimeType = text\xml

- DHClass = com.crossworlds.DataHandlers.text.xml
- DataHandlerConfigMOName = MO_DataHandler_Default

The fields for these values in the **Data Handler** tab are displayed only if you have set the ContainerManagedEvents property to the value JMS.

Note: When ContainerManagedEvents is set to JMS, the connector does not call its pollForEvents() method, thereby disabling that method's functionality.

The ContainerManagedEvents property is valid only if the value of the DeliveryTransport property is set to JMS.

There is no default value.

ControllerEventSequencing

The ControllerEventSequencing property enables event sequencing in the connector controller.

This property is valid only if the value of the RepositoryDirectory property is set to set to <REMOTE> (BrokerType is ICS).

The default value is true.

ControllerStoreAndForwardMode

The ControllerStoreAndForwardMode property sets the behavior of the connector controller after it detects that the destination application-specific component is unavailable.

If this property is set to true and the destination application-specific component is unavailable when an event reaches InterChange Server Express (ICS), the connector controller blocks the request to the application-specific component. When the application-specific component becomes operational, the controller forwards the request to it.

However, if the destination application's application-specific component becomes unavailable after the connector controller forwards a service call request to it, the connector controller fails the request.

If this property is set to false, the connector controller begins failing all service call requests as soon as it detects that the destination application-specific component is unavailable.

This property is valid only if the value of the RepositoryDirectory property is set to <REMOTE> (the value of the BrokerType property is ICS).

The default value is true.

ControllerTraceLevel

The ControllerTraceLevel property sets the level of trace messages for the connector controller.

This property is valid only if the value of the RepositoryDirectory property is set to set to <REMOTE>.

The default value is 0.

DeliveryQueue

The DeliveryQueue property defines the queue that is used by the connector to send business objects to the integration broker.

This property is valid only if the value of the DeliveryTransport property is set to JMS.

The default value is `<CONNECTORNAME>/DELIVERYQUEUE`.

DeliveryTransport

The DeliveryTransport property specifies the transport mechanism for the delivery of events. For Java Messaging Service, the value is JMS.
- If the value of the RepositoryDirectory property is set to <REMOTE>, the value of the DeliveryTransport property can be IDL or JMS, and the default is IDL.
- If the value of the RepositoryDirectory property is a local directory, the value can be only JMS.

The connector sends service-call requests and administrative messages over CORBA IIOP if the value of the RepositoryDirectory property is IDL.

The default value is JMS.

JMS

The JMS transport mechanism enables communication between the connector and client connector framework using Java Messaging Service (JMS).

If you select JMS as the delivery transport, additional JMS properties such as `jms.MessageBrokerName`, `jms.FactoryClassName`, `jms.Password`, and `jms.UserName` are listed in Connector Configurator Express. The properties `jms.MessageBrokerName` and `jms.FactoryClassName` are required for this transport.

There may be a memory limitation if you use the JMS transport mechanism for a connector in the following environment when InterChange Server Espress (ICS) is the integration broker.

In this environment, you may experience difficulty starting both the connector controller (on the server side) and the connector (on the client side) due to memory use within the WebSphere MQ client. If your installation uses less than 768MB of process heap size, set the following variable and property:
- Set the LDR_CNTRL environment variable in the CWSharedEnv.sh script.

  This script is located in the \bin directory below the product directory (*<ProductDir>*). Using a text editor, add the following line as the first line in the CWSharedEnv.sh script:

  `export LDR_CNTRL=MAXDATA=0x30000000`

  This line restricts heap memory usage to a maximum of 768 MB (3 segments * 256 MB). If the process memory grows larger than this limit, page swapping can occur, which can adversely affect the performance of your system.
- Set the value of the IPCCBaseAddress property to 11 or 12. For more information on this property, see the *WebSphere Business Integration Server Express Installation Guide for Windows, for Linux, or for i5/OS*.

DuplicateEventElimination

When the value of this property is `true`, a JMS-enabled connector can ensure that duplicate events are not delivered to the delivery queue. To use this feature, during connector development, the connector must have a unique event identifier set as the business object ObjectEventId attribute in the application-specific code.

Note: When the value of this property is `true`, the MonitorQueue property must be enabled to provide guaranteed event delivery.

The default value is `false`.

EnableOidForFlowMonitoring

When the value of this property is `true`, the adapter runtime will mark the incoming ObjectEventID as a foreign key for flow monitoring.

This property is only valid if the BrokerType property is set to ICS.

The default value is `false`.

FaultQueue

If the connector experiences an error while processing a message, it moves the message (and a status indicator and description of the problem) to the queue specified in the FaultQueue property.

The default value is `<CONNECTORNAME>/FAULTQUEUE`.

jms.FactoryClassName

The jms.FactoryClassName property specifies the class name to instantiate for a JMS provider. This property must be set if the value of the DeliveryTransport property is JMS.

The default is `CxCommon.Messaging.jms.IBMMQSeriesFactory`.

jms.ListenerConcurrency

The jms.ListenerConcurrency property specifies the number of concurrent listeners for the JMS controller. It specifies the number of threads that fetch and process messages concurrently within a controller.

This property is valid only if the value of the jms.OptimizedTransport property is `true`.

The default value is 1.

jms.MessageBrokerName

The jms.MessageBrokerName specifies the broker name to use for the JMS provider. You must set this connector property if you specify JMS as the delivery transport mechanism (in the DeliveryTransport property).

When you connect to a remote message broker, this property requires the following values:
`QueueMgrName:Channel:HostName:PortNumber`
where:
`QueueMgrName` is the name of the queue manager.

Channel is the channel used by the client.
HostName is the name of the machine where the queue manager is to reside.
PortNumber is the port number used by the queue manager for listening

For example:
jms.MessageBrokerName = WBIMB.Queue.Manager:CHANNEL1:RemoteMachine:1456

The default value is crossworlds.queue.manager. Use the default when connecting to a local message broker.

jms.NumConcurrentRequests

The jms.NumConcurrentRequests property specifies the maximum number of concurrent service call requests that can be sent to a connector at the same time. Once that maximum is reached, new service calls are blocked and must wait for another request to complete before proceeding.

The default value is 10.

jms.Password

The jms.Password property specifies the password for the JMS provider. A value for this property is optional.

There is no default value.

jms.TransportOptimized

The jms.TransportOptimized property determines if the WIP (work in progress) is optimized. You must have a WebSphere MQ provider to optimize the WIP. For optimized WIP to operate, the messaging provider must be able to:
1. Read a message without taking it off the queue
2. Delete a message with a specific ID without transferring the entire message to the receiver's memory space
3. Read a message by using a specific ID (needed for recovery purposes)
4. Track the point at which events that have not been read appear.

The JMS APIs cannot be used for optimized WIP because they do not meet conditions 2 and 4 above, but the MQ Java APIs meet all four conditions, and hence are required for optimized WIP.

This property is valid only if the value of DeliveryTransport is JMS and the value of BrokerType is ICS.

The default value is false.

jms.UserName

the jms.UserName property specifies the user name for the JMS provider. A value for this property is optional.

There is no default value.

JvmMaxHeapSize

The JvmMaxHeapSize property specifies the maximum heap size for the agent (in megabytes).

This property is valid only if the value for the RepositoryDirectory property is set to <REMOTE>.

The default value is 128m.

JvmMaxNativeStackSize

The JvmMaxNativeStackSize property specifies the maximum native stack size for the agent (in kilobytes).

This property is valid only if the value for the RepositoryDirectory property is set to <REMOTE>.

The default value is 128k.

JvmMinHeapSize

The JvmMinHeapSize property specifies the minimum heap size for the agent (in megabytes).

This property is valid only if the value for the RepositoryDirectory property is set to <REMOTE>.

The default value is 1m.

ListenerConcurrency

The ListenerConcurrency property supports multithreading in WebSphere MQ Listener when ICS is the integration broker. It enables batch writing of multiple events to the database, thereby improving system performance.

This property valid only with connectors that use MQ transport. The value of the DeliveryTransport property must be MQ.

The default value is 1.

Locale

The Locale property specifies the language code, country or territory, and, optionally, the associated character code set. The value of this property determines cultural conventions such as collation and sort order of data, date and time formats, and the symbols used in monetary specifications.

A locale name has the following format:
`ll_TT.codeset`

where:
ll is a two-character language code (in lowercase letters)
TT is a two-letter country or territory code (in uppercase letters)
codeset is the name of the associated character code set (may be optional).

By default, only a subset of supported locales are listed. To add other supported values to the list, you modify the \Data\Std\stdConnProps.xml file in the <*ProductDir*>\bin directory. For more information, refer to the Connector Configurator Express appendix in this guide.

If the connector has not been internationalized, the only valid value for this property is en_US. To determine whether a specific connector has been globalized, refer to the user guide for that adapter.

The default value is en_US.

LogAtInterchangeEnd

The LogAtInterchangeEnd property specifies whether to log errors to the log destination of the integration broker.

Logging to the log destination also turns on e-mail notification, which generates e-mail messages for the recipient specified as the value of MESSAGE_RECIPIENT in the InterchangeSystem.cfg file when errors or fatal errors occur. For example, when a connector loses its connection to the application, if the value of LogAtInterChangeEnd is true, an e-mail message is sent to the specified message recipient.

This property is valid only if the value of the RepositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The default value is false.

MaxEventCapacity

The MaxEventCapacity property specifies maximum number of events in the controller buffer. This property is used by the flow control feature.

This property is valid only if the value of the RepositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The value can be a positive integer between 1 and 2147483647.

The default value is 2147483647.

MessageFileName

The MessageFileName property specifies the name of the connector message file. The standard location for the message file is \connectors\messages in the product directory. Specify the message file name in an absolute path if the message file is not located in the standard location.

If a connector message file does not exist, the connector uses InterchangeSystem.txt as the message file. This file is located in the product directory.

Note: To determine whether a connector has its own message file, see the individual adapter user guide.

The default value is InterchangeSystem.txt.

MonitorQueue

The MonitorQueue property specifies the logical queue that the connector uses to monitor duplicate events.

It is valid only if the value of the DeliveryTransport property is JMS and the value of the DuplicateEventElimination is true.

The default value is `<CONNECTORNAME>/MONITORQUEUE`

OADAutoRestartAgent

the OADAutoRestartAgent property specifies whether the connector uses the automatic and remote restart feature. This feature uses the WebSphere MQ-triggered Object Activation Daemon (OAD) to restart the connector after an abnormal shutdown, or to start a remote connector from System Monitor.

This property must be set to `true` to enable the automatic and remote restart feature. For information on how to configure the WebSphere MQ-triggered OAD feature. see the *WebSphere Business Integration Server Express Installation Guide for Windows, for Linux* or *for i5/OS*.

This property is valid only if the value of the RespositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The default value is `false`.

OADMaxNumRetry

The OADMaxNumRetry property specifies the maximum number of times that the WebSphere MQ-triggered Object Activation Daemon (OAD) automatically attempts to restart the connector after an abnormal shutdown. The OADAutoRestartAgent property must be set to `true` for this property to take effect.

This property is valid only if the value of the RespositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The default value is `1000`.

OADRetryTimeInterval

The OADRetryTimeInterval property specifies the number of minutes in the retry-time interval for the WebSphere MQ-triggered Object Activation Daemon (OAD). If the connector agent does not restart within this retry-time interval, the connector controller asks the OAD to restart the connector agent again. The OAD repeats this retry process as many times as specified by the OADMaxNumRetry property. The OADAutoRestartAgent property must be set to `true` for this property to take effect.

This property is valid only if the value of the RespositoryDirectory property is set to <REMOTE> (the value of BrokerType is ICS).

The default value is `10`.

PollEndTime

The PollEndTime property specifies the time to stop polling the event queue. The format is `HH:MM`, where `HH` is 0 through 23 hours, and `MM` represents 0 through 59 minutes.

You must provide a valid value for this property. The default value is `HH:MM` without a value, and it must be changed.

If the adapter runtime detects:
- PollStartTime set and PollEndTime not set, or

- PollEndTime set and PollStartTime not set

it will poll using the value configured for the PollFrequency property.

PollFrequency

The PollFrequency property specifies the amount of time (in milliseconds) between the end of one polling action and the start of the next polling action. This is not the interval between polling actions. Rather, the logic is as follows:

- Poll to obtain the number of objects specified by the value of the PollQuantity property.
- Process these objects. For some connectors, this may be partly done on separate threads, which execute asynchronously to the next polling action.
- Delay for the interval specified by the PollFrequency property.
- Repeat the cycle.

The following values are valid for this property:

- The number of milliseconds between polling actions (a positive integer).
- The word `no`, which causes the connector not to poll. Enter the word in lowercase.
- The word `key`, which causes the connector to poll only when you type the letter `p` in the connector Command Prompt window. Enter the word in lowercase.

The default is `10000`.

Important: Some connectors have restrictions on the use of this property. Where they exist, these restrictions are documented in the chapter on installing and configuring the adapter.

PollQuantity

The PollQuantity property designates the number of items from the application that the connector polls for. If the adapter has a connector-specific property for setting the poll quantity, the value set in the connector-specific property overrides the standard property value.

This property is valid only if the value of the `DeliveryTransport` property is JMS, and the `ContainerManagedEvents` property has a value.

An e-mail message is also considered an event. The connector actions are as follows when it is polled for e-mail.

- When it is polled once, the connector detects the body of the message, which it reads as an attachment. Since no data handler was specified for this mime type, it will then ignore the message.
- The connector processes the first BO attachment. The data handler is available for this MIME type, so it sends the business object to Visual Test Connector.
- When it is polled for the second time, the connector processes the second BO attachment. The data handler is available for this MIME type, so it sends the business object to Visual Test Connector.
- Once it is accepted, the third BO attachment should be transmitted.

PollStartTime

The PollStartTime property specifies the time to start polling the event queue. The format is *HH:MM*, where *HH* is 0 through 23 hours, and *MM* represents 0 through 59 minutes.

You must provide a valid value for this property. The default value is HH:MM without a value, and it must be changed.

If the adapter runtime detects:
- PollStartTime set and PollEndTime not set, or
- PollEndTime set and PollStartTime not set

it will poll using the value configured for the PollFrequency property.

RepositoryDirectory

The RepositoryDirectory property is the location of the repository from which the connector reads the XML schema documents that store the metadata for business object definitions.

If the integration broker is ICS, this value must be set to set to <REMOTE> because the connector obtains this information from the InterChange Server Express repository.

When the integration broker is a WebSphere message broker or WAS, this value is set to *<ProductDir>*\repository by default. However, it may be set to any valid directory name.

RequestQueue

The RequestQueue property specifies the queue that is used by the integration broker to send business objects to the connector.

This property is valid only if the value of the DeliveryTransport property is JMS.

The default value is *<CONNECTORNAME>*/REQUESTQUEUE.

ResponseQueue

The ResponseQueue property specifies the JMS response queue, which delivers a response message from the connector framework to the integration broker. When the integration broker is InterChange Server Express (ICS), the server sends the request and waits for a response message in the JMS response queue.

This property is valid only if the value of the DeliveryTransport property is JMS.

The default value is *<CONNECTORNAME>*/RESPONSEQUEUE.

RestartRetryCount

The RestartRetryCount property specifies the number of times the connector attempts to restart itself. When this property is used for a connector that is connected in parallel, it specifies the number of times the master connector application-specific component attempts to restart the client connector application-specific component.

The default value is 3.

RestartRetryInterval

The RestartRetryInterval property specifies the interval in minutes at which the connector attempts to restart itself. When this property is used for a connector that is linked in parallel, it specifies the interval at which the master connector application-specific component attempts to restart the client connector application-specific component.

Possible values for the property range from 1 through 2147483647.

The default value is 1.

RHF2MessageDomain

The RHF2MessageDomain property allows you to configure the value of the field domain name in the JMS header. When data is sent to a WebSphere message broker over JMS transport, the adapter framework writes JMS header information, with a domain name and a fixed value of mrm. A configurable domain name lets you track how the WebSphere message broker processes the message data.

This is an example header:
```
<mcd><Msd>mrm</Msd><Set>3</Set><Type>
Retek_POPhyDesc</Type><Fmt>CwXML</Fmt></mcd>
```

This property is not valid if the value of BrokerType is ICS. Also, it is valid only if the value of the DeliveryTransport property is JMS, and the value of the WireFormat property is CwXML.

Possible values are mrm and xml. The default value is mrm.

SourceQueue

The SourceQueue property designates the JMS source queue for the connector framework in support of guaranteed event delivery for JMS-enabled connectors that use a JMS event store. For further information, see "ContainerManagedEvents" on page 69.

This property is valid only if the value of DeliveryTransport is JMS, and a value for ContainerManagedEvents is specified.

The default value is <CONNECTORNAME>/SOURCEQUEUE.

SynchronousRequestQueue

The SynchronousRequestQueue property delivers request messages that require a synchronous response from the connector framework to the broker. This queue is necessary only if the connector uses synchronous execution. With synchronous execution, the connector framework sends a message to the synchronous request queue and waits for a response from the broker on the synchronous response queue. The response message sent to the connector has a correlation ID that matches the ID of the original message.

This property is valid only if the value of DeliveryTransport is JMS.

The default value is <CONNECTORNAME>/SYNCHRONOUSREQUESTQUEUE

SynchronousRequestTimeout

The SynchronousRequestTimeout property specifies the time in milliseconds that the connector waits for a response to a synchronous request. If the response is not received within the specified time, the connector moves the original synchronous request message (and error message) to the fault queue.

This property is valid only if the value of DeliveryTransport is JMS.

The default value is `0`.

SynchronousResponseQueue

The SynchronousResponseQueue property delivers response messages in reply to a synchronous request from the broker to the connector framework. This queue is necessary only if the connector uses synchronous execution.

This property is valid only if the value of DeliveryTransport is JMS.

The default is `<CONNECTORNAME>/SYNCHRONOUSRESPONSEQUEUE`

TivoliMonitorTransactionPerformance

The TivoliMonitorTransactionPerformance property specifies whether IBM Tivoli Monitoring for Transaction Performance (ITMTP) is invoked at run time.

The default value is `false`.

WireFormat

The WireFormat property specifies the message format on the transport:
- If the value of the RepositoryDirectory property is a local directory, the value is `CwXML`.
- If the value of the RepositoryDirectory property is a remote directory, the value is `CwBO`.

Appendix B. Connector Configurator Express

This appendix describes how to use Connector Configurator Express to set configuration property values for your adapter.

You use Connector Configurator Express to:
- Create a connector-specific property template for configuring your connector
- Create a configuration file
- Set properties in a configuration file

The topics covered in this appendix are:
- "Overview of Connector Configurator Express"
- "Creating a connector-specific property template" on page 83
- "Creating a new configuration file" on page 85
- "Setting the configuration file properties" on page 88

Overview of Connector Configurator Express

Connector Configurator Express allows you to configure the connector component of your adapter for use with the InterChange Server Express integration broker.

You use Connector Configurator Express to:
- Create a **connector-specific property template** for configuring your connector.
- Create a **connector configuration file**; you must create one configuration file for each connector you install.
- Set properties in a configuration file.
  You may need to modify the default values that are set for properties in the connector templates. You must also designate supported business object definitions and, with InterChange Server Express, maps for use with collaborations as well as specify messaging, logging and tracing, and data handler parameters, as required.

Connector configuration properties include both standard configuration properties (the properties that all connectors have) and connector-specific properties (properties that are needed by the connector for a specific application or technology).

Because **standard properties** are used by all connectors, you do not need to define those properties from scratch; Connector Configurator Express incorporates them into your configuration file as soon as you create the file. However, you do need to set the value of each standard property in Connector Configurator Express.

The range of standard properties may not be the same for all brokers and all configurations. Some properties are available only if other properties are given a specific value. The Standard Properties window in Connector Configurator Express will show the properties available for your particular configuration.

For **connector-specific properties**, however, you need first to define the properties and then set their values. You do this by creating a connector-specific property template for your particular adapter. There may already be a template set up in

your system, in which case, you simply use that. If not, follow the steps in
"Creating a new template" on page 83 to set up a new one.

Running connectors on Linux

Connector Configurator Express runs only in a Windows environment. If you are
running the connector in a Linux environment, use Connector Configurator
Express in Windows to modify the configuration file and then copy the file to your
Linux environment.

Some properties in the Connector Configurator Express use directory paths, which
default to the Windows convention for directory paths. If you use the
configuration file in a Linux environment, revise the directory paths to match the
Linux convention for these paths. Select the target operating system in the toolbar
drop-list so that the correct operating system rules are used for extended
validation.

Starting Connector Configurator Express

You can start and run Connector Configurator Express in either of two modes:
- Independently, in stand-alone mode
- From System Manager

Running Configurator in stand-alone mode

You can run Connector Configurator Express without running System Manager
and work with connector configuration files, irrespective of your broker.

To do so:
- **Start>All Programs,** click **IBM WebSphere Business Integration
  Express>Toolset Express>Development>Connector Configurator Express.**
- Select **File>New>Connector Configuration**.

You may choose to run Connector Configurator Express independently to generate
the file, and then connect to System Manager to save it in a System Manager
project (see "Completing a configuration file" on page 88.)

Running Configurator from System Manager

You can run Connector Configurator Express from System Manager.

To run Connector Configurator Express:
1. Open the System Manager.
2. In the System Manager window, expand the **Integration Component Libraries**
   icon and highlight **Connectors**.
3. From the System Manager menu bar, click **Tools>Connector Configurator
   Express**. The Connector Configurator Express window opens and displays a
   New Connector dialog box.
4. When you click the pull-down menu next to **System Connectivity Integration
   Broker**, you can select ICS.

To edit an existing configuration file:

- In the System Manager window, select any of the configuration files listed in the Connector folder and right-click on it. Connector Configurator Express opens and displays the configuration file with the integration broker type and file name at the top.
- From Connector Configurator Express, select **File>Open**. Select the name of the connector configuration file from a project or from the directory in which it is stored.
- Click the Standard Properties tab to see which properties are included in this configuration file.

Creating a connector-specific property template

To create a configuration file for your connector, you need a connector-specific property template as well as the system-supplied standard properties.

You can create a brand-new template for the connector-specific properties of your connector, or you can use an existing connector definition as the template.

- To create a new template, see "Creating a new template" on page 83.
- To use an existing file, simply modify an existing template and save it under the new name. You can find existing templates in your \ProductDir\bin\Data\App directory.

Creating a new template

This section describes how you create properties in the template, define general characteristics and values for those properties, and specify any dependencies between the properties. Then you save the template and use it as the base for creating a new connector configuration file.

To create a template in Connector Configurator Express:

1. Click **File>New>Connector-Specific Property Template**.
2. The **Connector-Specific Property Template** dialog box appears.
   - Enter a name for the new template in the **Name** field below **Input a New Template Name.** You will see this name again when you open the dialog box for creating a new configuration file from a template.
   - To see the connector-specific property definitions in any template, select that template's name in the **Template Name** display. A list of the property definitions contained in that template appears in the **Template Preview** display.
3. You can use an existing template whose property definitions are similar to those required by your connector as a starting point for your template. If you do not see any template that displays the connector-specific properties used by your connector, you will need to create one.
   - If you are planning to modify an existing template, select the name of the template from the list in the **Template Name** table below **Select the Existing Template to Modify: Find Template.**
   - This table displays the names of all currently available templates. You can also search for a template.

Specifying general characteristics

When you click **Next** to select a template, the **Properties - Connector-Specific Property Template** dialog box appears. The dialog box has tabs for General characteristics of the defined properties and for Value restrictions. The General display has the following fields:

- **General:**
  Property Type
  Property Subtype
  Updated Method
  Description
- **Flags**
  Standard flags
- **Custom Flag**
  Flag

The **Property Subtype** can be selected when **Property Type** is a String. It is an optional value which provides syntax checking when you save the configuration file. The default is a blank space, and means that the property has not been subtyped.

After you have made selections for the general characteristics of the property, click the **Value** tab.

Specifying values

The **Value** tab enables you to set the maximum length, the maximum multiple values, a default value, or a value range for the property. It also allows editable values. To do so:

1. Click the **Value** tab. The display panel for Value replaces the display panel for General.
2. Select the name of the property in the **Edit properties** display.
3. In the fields for **Max Length** and **Max Multiple Values**, enter your values.

To create a new property value:

1. Right-click on the square to the left of the Value column heading.
2. From the pop-up menu, select **Add** to display the Property Value dialog box. Depending on the property type, the dialog box allows you to enter either a value, or both a value and a range.
3. Enter the new property value and click OK. The value appears in the **Value** panel on the right.

The **Value** panel displays a table with three columns:

The **Value** column shows the value that you entered in the **Property Value** dialog box, and any previous values that you created.

The **Default Value** column allows you to designate any of the values as the default.

The **Value Range** shows the range that you entered in the **Property Value** dialog box.

After a value has been created and appears in the grid, it can be edited from within the table display.

To make a change in an existing value in the table, select an entire row by clicking on the row number. Then right-click in the **Value** field and click **Edit Value**.

Setting dependencies

When you have made your changes to the **General** and **Value** tabs, click **Next**. The **Dependencies - Connector-Specific Property Template** dialog box appears.

A dependent property is a property that is included in the template and used in the configuration file *only if* the value of another property meets a specific condition. For example, `PollQuantity` appears in the template only if JMS is the transport mechanism and `DuplicateEventElimination` is set to `True`.
To designate a property as dependent and to set the condition upon which it depends, do this:

1. In the **Available Properties** display, select the property that will be made dependent.
2. In the **Select Property** field, use the drop-down menu to select the property that will hold the conditional value.
3. In the **Condition Operator** field, select one of the following:

   == (equal to)

   != (not equal to)

   > (greater than)

   < (less than)

   >= (greater than or equal to)

   <=(less than or equal to)

4. In the **Conditional Value** field, enter the value that is required in order for the dependent property to be included in the template.
5. With the dependent property highlighted in the **Available Properties** display, click an arrow to move it to the **Dependent Property** display.
6. Click **Finish**. Connector Configurator Express stores the information you have entered as an XML document, under `\data\app` in the `\bin` directory where you have installed Connector Configurator Express.

Setting pathnames

Some general rules for setting pathnames are:

- The maximum length of a filename in Windows and Linux is 255 characters.
- In Windows, the absolute pathname must follow the format [Drive:][Directory]\filename: for example, C:\WebSphereAdapters\bin\Data\Std\StdConnProps.xml In Linux the first character should be /.
- Queue names may not have leading or embedded spaces.

Creating a new configuration file

When you create a new configuration file, you must name it and select an integration broker.

You also select an operating system for extended validation on the file. The toolbar has a droplist called **Target System** that allows you to select the target operating system for extended validation of the properties. The available options are: Windows, Linux, and i5/OS, Other (if not Windows or Linux), and None-no extended validation (switches off extended validation). The default on startup is Windows.

To start Connector Configurator Express:

- In the System Manager window, select **Connector Configurator Express** from the **Tools** menu. Connector Configurator Express opens.
- In stand-alone mode, launch Connector Configurator Express.

To set the operating system for extended validation of the configuration file:
- Pull down the **Target System:** droplist on the menu bar.
- Select the operating system you are running on.

Then select **File>New>Connector Configuration**. In the New Connector window, enter the name of the new connector.

You also need to select an integration broker. The broker you select determines the properties that will appear in the configuration file. To select a broker:
- In the **Integration Broker** field, select ICS.
- Complete the remaining fields in the **New Connector** window, as described later in this chapter.

Creating a configuration file from a connector-specific template

Once a connector-specific template has been created, you can use it to create a configuration file:

1. Set the operating system for extended validation of the configuration file using the **Target System:** droplist on the menu bar (see "Creating a new configuration file" above).
2. Click **File>New>Connector Configuration**.
3. The **New Connector** dialog box appears, with the following fields:
   - **Name**

     Enter the name of the connector. Names are case-sensitive. The name you enter must be unique, and must be consistent with the file name for a connector that is installed on the system.

     Important: Connector Configurator Express does not check the spelling of the name that you enter. You must ensure that the name is correct.

   - **System Connectivity**
     Click ICS.

   - **Select Connector-Specific Property Template**

     Type the name of the template that has been designed for your connector. The available templates are shown in the **Template Name** display. When you select a name in the Template Name display, the **Property Template Preview** display shows the connector-specific properties that have been defined in that template.

     Select the template you want to use and click **OK**.
4. A configuration screen appears for the connector that you are configuring. The title bar shows the integration broker and connector name. You can fill in all the field values to complete the definition now, or you can save the file and complete the fields later.
5. To save the file, click **File>Save>To File** or **File>Save>To Project**. To save to a project, System Manager must be running. If you save as a file, the **Save File Connector** dialog box appears. Choose *.cfg as the file type, verify in the File Name field that the name is spelled correctly and has the correct case, navigate

to the directory where you want to locate the file, and click **Save**. The status display in the message panel of Connector Configurator Express indicates that the configuration file was successfully created.

> **Important:** The directory path and name that you establish here must match the connector configuration file path and name that you supply in the startup file for the connector.

6. To complete the connector definition, enter values in the fields for each of the tabs of the Connector Configurator Express window, as described later in this chapter.

Using an existing file

You may have an existing file available in one or more of the following formats:

- A connector definition file.This is a text file that lists properties and applicable default values for a specific connector. Some connectors include such a file in a \repository directory in their delivery package (the file typically has the extension .txt; for example, CN_JMS.txt for the JMS connector).
- An ICS repository file. Definitions used in a previous ICS implementation of the connector may be available to you in a repository file that was used in the configuration of that connector. Such a file typically has the extension .in or .out.
- A previous configuration file for the connector.
  Such a file typically has the extension *.cfg.

Although any of these file sources may contain most or all of the connector-specific properties for your connector, the connector configuration file will not be complete until you have opened the file and set properties, as described later in this chapter.

To use an existing file to configure a connector, you must open the file in Connector Configurator Express, revise the configuration, and then resave the file.

Follow these steps to open a *.txt, *.cfg, or *.in file from a directory:

1. In Connector Configurator Express, click **File>Open>From File**.
2. In the **Open File Connector** dialog box, select one of the following file types to see the available files:
   - Configuration (*.cfg)
   - ICS Repository (*.in, *.out)

     Choose this option if a repository file was used to configure the connector in an ICS environment. A repository file may include multiple connector definitions, all of which will appear when you open the file.
   - All files (*.*)

     Choose this option if a *.txt file was delivered in the adapter package for the connector, or if a definition file is available under another extension.
3. In the directory display, navigate to the appropriate connector definition file, select it, and click **Open**.

Follow these steps to open a connector configuration from a System Manager project:

1. Start System Manager. A configuration can be opened from or saved to System Manager only if System Manager has been started.
2. Start Connector Configurator Express.

3. Click **File>Open>From Project**.

Completing a configuration file

When you open a configuration file or a connector from a project, the Connector Configurator Express window displays the configuration screen, with the current attributes and values.

The title of the configuration screen displays the integration broker and connector name as specified in the file. Make sure you have the correct broker. If not, change the broker value before you configure the connector. To do so:

1. Under the **Standard Properties** tab, select the value field for the BrokerType property. In the drop-down menu, select the value ICS.
2. The Standard Properties tab will display the connector properties associated with the selected broker. The table shows **Property name**, **Value**, **Type**, **Subtype** (if the Type is a string), **Description**, and **Update Method**.
3. You can save the file now or complete the remaining configuration fields, as described in "Specifying supported business object definitions" on page 91..
4. When you have finished your configuration, click **File>Save>To Project** or **File>Save>To File**.

   If you are saving to file, select *.cfg as the extension, select the correct location for the file and click **Save**.

   If multiple connector configurations are open, click **Save All to File** to save all of the configurations to file, or click **Save All to Project** to save all connector configurations to a System Manager project.

   Before you created the configuration file, you used the **Target System** droplist that allows you to select the target operating system for extended validation of the properties.

   Before it saves the file, Connector Configurator Express checks that values have been set for all required standard properties. If a required standard property is missing a value, Connector Configurator Express displays a message that the validation failed. You must supply a value for the property in order to save the configuration file.

   If you have elected to use the extended validation feature by selecting a value of Windows, Linux, and i5/OS, or Other from the **Target System** droplist, the system will validate the property subtype s well as the type, and it displays a warning message if the validation fails.

Setting the configuration file properties

When you create and name a new connector configuration file, or when you open an existing connector configuration file, Connector Configurator Express displays a configuration screen with tabs for the categories of required configuration values.

Connector Configurator Express requires values for properties in these categories for connectors running on all brokers:
- Standard Properties
- Connector-specific Properties
- Supported Business Objects
- Trace/Log File values
- Data Handler (applicable for connectors that use JMS messaging with guaranteed event delivery)

Note: For connectors that use JMS messaging, an additional category may display, for configuration of data handlers that convert the data to business objects.

For connectors running on InterChange Server Express, values for these properties are also required:
- Associated Maps
- Security

Important: Connector Configurator Express accepts property values in either English or non-English character sets. However, the names of both standard and connector-specific properties, and the names of supported business objects, must use the English character set only.

Standard properties differ from connector-specific properties as follows:
- Standard properties of a connector are shared by both the application-specific component of a connector and its broker component. All connectors have the same set of standard properties. These properties are described in Appendix A of each adapter guide. You can change some but not all of these values.
- Application-specific properties apply only to the application-specific component of a connector, that is, the component that interacts directly with the application. Each connector has application-specific properties that are unique to its application. Some of these properties provide default values and some do not; you can modify some of the default values. The installation and configuration chapters of each adapter guide describe the application-specific properties and the recommended values.

The fields for **Standard Properties** and **Connector-Specific Properties** are color-coded to show which are configurable:
- A field with a grey background indicates a standard property. You can change the value but cannot change the name or remove the property.
- A field with a white background indicates an application-specific property. These properties vary according to the specific needs of the application or connector. You can change the value and delete these properties.
- Value fields are configurable.
- The **Update Method** field is displayed for each property. It indicates whether a component or agent restart is necessary to activate changed values. You cannot configure this setting.

Setting standard connector properties

To change the value of a standard property:
1. Click in the field whose value you want to set.
2. Either enter a value, or select one from the drop-down menu if it appears.

   Note: If the property has a Type of String, it may have a subtype value in the Subtype column. This subtype is used for extended validation of the property.
3. After entering all the values for the standard properties, you can do one of the following:
   - To discard the changes, preserve the original values, and exit Connector Configurator Express, click **File>Exit** (or close the window), and click **No** when prompted to save changes.

- To enter values for other categories in Connector Configurator Express, select the tab for the category. The values you enter for **Standard Properties** (or any other category) are retained when you move to the next category. When you close the window, you are prompted to either save or discard the values that you entered in all the categories as a whole.
- To save the revised values, click **File>Exit** (or close the window) and click **Yes** when prompted to save changes. Alternatively, click **Save>To File** from either the File menu or the toolbar.

To get more information on a particular standard property, left-click the entry in the Description column for that property in the Standard Properties tabbed sheet. If you have Extended Help installed, an arrow button will appear on the right. When you click on the button, a Help window will open and display details of the standard property.

Note: If the hot button does not appear, no Extended Help was found for that property.

If installed, the Extended Help files are located in *<ProductDir>*\bin\Data\Std\Help*<RegionalSetting>*\.

Setting connector-specific configuration properties

For connector-specific configuration properties, you can add or change property names, configure values, delete a property, and encrypt a property. The default property length is 255 characters.
1. Right-click in the top left portion of the grid. A pop-up menu bar will appear. Click **Add** to add a property. To add a child property, right-click on the parent row number and click **Add child**.
2. Enter a value for the property or child property.

   Note: If the property has a Type of String, you can select a subtype from the Subtype droplist. This subtype is used for extended validation of the property.
3. To encrypt a property, select the **Encrypt** box.
4. To get more information on a particular property, left-click the entry in the Description column for that property. If you have Extended Help installed, a hot button will appear. When you click on the hot button, a Help window will open and display details of the standard property.

   Note: If the hot button does not appear, no Extended Help was found for that property.
5. Choose to save or discard changes, as described for "Setting standard connector properties" on page 89.

If the Extended Help files are installed and the AdapterHelpName property is blank, Connector Configurator Express will point to the adapter-specific Extended Help files located in *<ProductDir>*\bin\Data\App\Help*<RegionalSetting>*\. Otherwise, Connector Configurator Express will point to the adapter-specific Extended Help files located in *<ProductDir>*\bin\Data\App\Help*<AdapterHelpName>**<RegionalSetting>*\. See the AdapterHelpName property described in the Standard Properties appendix.

The Update Method displayed for each property indicates whether a component or agent restart is necessary to activate changed values.

Important: Changing a preset application-specific connector property name may cause a connector to fail. Certain property names may be needed by the connector to connect to an application or to run properly.

Encryption for connector properties

Application-specific properties can be encrypted by selecting the **Encrypt** check box in the Connector-specific Properties window. To decrypt a value, click to clear the **Encrypt** check box, enter the correct value in the **Verification** dialog box, and click **OK**. If the entered value is correct, the value is decrypted and displays.

The adapter user guide for each connector contains a list and description of each property and its default value.

If a property has multiple values, the **Encrypt** check box will appear for the first value of the property. When you select **Encrypt**, all values of the property will be encrypted. To decrypt multiple values of a property, click to clear the **Encrypt** check box for the first value of the property, and then enter the new value in the **Verification** dialog box. If the input value is a match, all multiple values will decrypt.

Update method

Refer to the descriptions of update methods found in the Standard Properties appendix, under "Standard connector properties overview"Appendix A, "Standard configuration properties for connectors," on page 61.

Specifying supported business object definitions

Use the **Supported Business Objects** tab in Connector Configurator Express to specify the business objects that the connector will use. You must specify both generic business objects and application-specific business objects, and you must specify associations for the maps between the business objects.

Note: Some connectors require that certain business objects be specified as supported in order to perform event notification or additional configuration (using meta-objects) with their applications.

InterChange Server Express as your broker

To specify that a business object definition is supported by the connector, or to change the support settings for an existing business object definition, click the **Supported Business Objects** tab and use the following fields.

Business object name: To designate that a business object definition is supported by the connector, with System Manager running:

1. Click an empty field in the **Business Object Name** list. A drop list displays, showing all the business object definitions that exist in the System Manager project.
2. Click on a business object to add it.
3. Set the **Agent Support** (described below) for the business object.
4. In the File menu of the Connector Configurator Express window, click **Save to Project**. The revised connector definition, including designated support for the added business object definition, is saved to an ICL (Integration Component Library) project in System Manager.

To delete a business object from the supported list:

1. To select a business object field, click the number to the left of the business object.

2. From the **Edit** menu of the Connector Configurator Express window, click **Delete Row**. The business object is removed from the list display.

3. From the **File** menu, click **Save to Project**.

Deleting a business object from the supported list changes the connector definition and makes the deleted business object unavailable for use in this implementation of this connector. It does not affect the connector code, nor does it remove the business object definition itself from System Manager.

Agent support: If a business object has Agent Support, the system will attempt to use that business object for delivering data to an application via the connector agent.

Typically, application-specific business objects for a connector are supported by that connector's agent, but generic business objects are not.

To indicate that the business object is supported by the connector agent, check the **Agent Support** box. The Connector Configurator Express window does not validate your Agent Support selections.

Maximum transaction level: The maximum transaction level for a connector is the highest transaction level that the connector supports.

For most connectors, Best Effort is the only possible choice.

You must restart the server for changes in transaction level to take effect.

Associated maps

Each connector supports a list of business object definitions and their associated maps that are currently active in InterChange Server Express. This list appears when you select the **Associated Maps** tab.

The list of business objects contains the application-specific business object which the agent supports and the corresponding generic object that the controller sends to the subscribing collaboration. The association of a map determines which map will be used to transform the application-specific business object to the generic business object or the generic business object to the application-specific business object.

If you are using maps that are uniquely defined for specific source and destination business objects, the maps will already be associated with their appropriate business objects when you open the display, and you will not need (or be able) to change them.

If more than one map is available for use by a supported business object, you will need to explicitly bind the business object with the map that it should use.

The **Associated Maps** tab displays the following fields:

- **Business Object Name**

  These are the business objects supported by this connector, as designated in the **Supported Business Objects** tab. If you designate additional business objects under the Supported Business Objects tab, they will be reflected in this list after you save the changes by choosing **Save to Project** from the **File** menu of the Connector Configurator Express window.

- **Associated Maps**

The display shows all the maps that have been installed to the system for use with the supported business objects of the connector. The source business object for each map is shown to the left of the map name, in the **Business Object Name** display.

- **Explicit Binding**

  In some cases, you may need to explicitly bind an associated map.

  Explicit binding is required only when more than one map exists for a particular supported business object. When InterChange Server Express boots, it tries to automatically bind a map to each supported business object for each connector. If more than one map takes as its input the same business object, the server attempts to locate and bind one map that is the superset of the others.

  If there is no map that is the superset of the others, the server will not be able to bind the business object to a single map, and you will need to set the binding explicitly.

  To explicitly bind a map:

  1. In the **Explicit** column, place a check in the check box for the map you want to bind.
  2. Select the map that you intend to associate with the business object.
  3. In the **File** menu of the Connector Configurator Express window, click **Save to Project**.
  4. Deploy the project to InterChange Server Express.
  5. Reboot the server for the changes to take effect.

Security

You can use the **Security** tab in Connector Configurator Express to set various privacy levels for a message. You can only use this feature when the DeliveryTransport property is set to JMS.

By default, Privacy is turned off. Check the **Privacy** box to enable it.

The **Keystore Target System Absolute Pathname** is:
- For Windows:
  `<ProductDir>\connectors\security\<connectorname>.jks`
- For Linux and i5/OS:
  `/ProductDir/connectors/security/<connectorname>.jks`

This path and file should be on the system where you plan to start the connector, that is, the target system.

You can use the Browse button at the right only if the target system is the one currently running. It is greyed out unless **Privacy** is enabled and the **Target System** in the menu bar is set to Windows.

The **Message Privacy Level** may be set as follows for the three messages categories (All Messages, All Administrative Messages, and All Business Object Messages):
- "": is the default; used when no privacy levels for a message category have been set.
- none: Not the same as the default: use this to deliberately set a privacy level of none for a message category.
- integrity
- privacy

- integrity_plus_privacy

The **Key Maintenance** feature lets you generate, import and export public keys for the server and adapter.

- When you select **Generate Keys**, the Generate Keys dialog box appears with the defaults for the keytool that will generate the keys.
- The keystore value defaults to the value you entered in **Keystore Target System Absolute Pathname** on the Security tab.
- When you select OK, the entries are validated, the key certificate is generated and the output is sent to the Connector Configurator Express log window.

Before you can import a certificate into the adapter keystore, you must export it from the server keystore. When you select **Export Adapter Public Key**, the Export Adapter Public Key dialog box appears.

- The export certificate defaults to the same value as the keystore, except that the file extension is <filename>.cer.

When you select **Import Server Public Key**, the Import Server Public Key dialog box appears.

- The import certificate defaults to *<ProductDir>*\bin\ics.cer (if the file exists on the system).
- The import Certificate Association should be the server name. If a server is registered, you can select it from the droplist.

The **Adapter Access Control** feature is enabled only when the value of DeliveryTransport is IDL. By default, the adapter logs in with the guest identity. If the **Use guest identity** box is not checked, the **Adapter Identity** and **Adapter Password** fields are enabled.

Setting trace/log file values

When you open a connector configuration file or a connector definition file, Connector Configurator Express uses the logging and tracing values of that file as default values. You can change those values in Connector Configurator Express.

To change the logging and tracing values:

1. Click the **Trace/Log Files** tab.
2. For either logging or tracing, you can choose to write messages to one or both of the following:
   - To console (STDOUT): Writes logging or tracing messages to the STDOUT display.

     Note: You can only use the STDOUT option from the **Trace/Log Files** tab for connectors running on the Windows platform.

   - To File: Writes logging or tracing messages to a file that you specify. To specify the file, click the directory button (ellipsis), navigate to the preferred location, provide a file name, and click **Save**. Logging or tracing message are written to the file and location that you specify.

     Note: Both logging and tracing files are simple text files. You can use the file extension that you prefer when you set their file names. For tracing files, however, it is advisable to use the extension `.trace` rather than `.trc`, to avoid confusion with other files that might reside on the system. For logging files, `.log` and `.txt` are typical file extensions.

Data handlers

The data handlers section is available for configuration only if you have designated a value of JMS for DeliveryTransport and a value of JMS for ContainerManagedEvents. Not all adapters make use of data handlers.

See the descriptions under `ContainerManagedEvents` in Appendix A, Standard Properties, for values to use for these properties.

Saving your configuration file

When you have finished configuring your connector, save the connector configuration file. Connector Configurator Express saves the file in the broker mode that you selected during configuration. The title bar of Connector Configurator Express always displays the broker mode that InterChange Server Express is currently using.

The file is saved as an XML document. You can save the XML document in three ways:

* From System Manager, as a file with a `*.con` extension in an Integration Component Library, or
* In a directory that you specify.
* In stand-alone mode, as a file with a `*.cfg` extension in a directory folder. By default, the file is saved to `\WebSphereAdapters\bin\Data\App`.

For details about using projects in System Manager, and for further information about deployment, see the System Implementation Guide.

Changing a configuration file

You can change the integration broker setting for an existing configuration file. This enables you to use the file as a template for creating a new configuration file, which can be used with a different broker.

Note: You will need to change other configuration properties as well as the broker mode property if you switch integration brokers.

To change your broker selection within an existing configuration file (optional):

* Open the existing configuration file in Connector Configurator Express.
* Select the **Standard Properties** tab.
* In the **BrokerType** field of the Standard Properties tab, select the value that is appropriate for your broker. When you change the current value, the available tabs and field selections in the properties window will immediately change, to show only those tabs and fields that pertain to the new broker you have selected.

Completing the configuration

After you have created a configuration file for a connector and modified it, make sure that the connector can locate the configuration file when the connector starts up.

To do so, open the startup file used for the connector, and verify that the location and file name used for the connector configuration file match exactly the name you have given the file and the directory or path where you have placed it.

Using Connector Configurator Express in a globalized environment

Connector Configurator Express is globalized and can handle character conversion between the configuration file and the integration broker. Connector Configurator Express uses native encoding. When it writes to the configuration file, it uses UTF-8 encoding.

Connector Configurator Express supports non-English characters in:

- All value fields
- Log file and trace file path (specified in the **Trace/Log files** tab)

The drop list for the `CharacterEncoding` and `Locale` standard configuration properties displays only a subset of supported values. To add other values to the drop list, you must manually modify the `\Data\Std\stdConnProps.xml` file in the product directory.

For example, to add the locale `en_GB` to the list of values for the `Locale` property, open the `stdConnProps.xml` file and add the line in boldface type below:

```
<Property name="Locale"
isRequired="true"
updateMethod="component restart">
                <ValidType>String</ValidType>
          <ValidValues>
                            <Value>ja_JP</Value>
                            <Value>ko_KR</Value>
                            <Value>zh_CN</Value>
                            <Value>zh_TW</Value>
                            <Value>fr_FR</Value>
                            <Value>de_DE</Value>
                            <Value>it_IT</Value>
                            <Value>es_ES</Value>
                            <Value>pt_BR</Value>
                            <Value>en_US</Value>
                            <Value>en_GB</Value>

                <DefaultValue>en_US</DefaultValue>
          </ValidValues>
     </Property>
```

Notices

This information was developed for products and services offered in the U.S.A. IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service. IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, NY 10504-1785
U.S.A.

For license inquiries regarding double-byte (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

IBM World Trade Asia Corporation Licensing
2-31 Roppongi 3-chome, Minato-ku
Tokyo 106-0032, Japan

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you. This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice. Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk. IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you. Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM Corporation
577 Airport Blvd., Suite 800
Burlingame, CA 94010
U.S.A

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee. The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us. Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment. Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products. All statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only. This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental. COPYRIGHT LICENSE: This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. If you are viewing this information softcopy, the photographs and color illustrations may not appear.

Programming interface information

Programming interface information, if provided, is intended to help you create application software using this program.

General-use programming interfaces allow you to write application software that obtain the services of this program's tools.

However, this information may also contain diagnosis, modification, and tuning information. Diagnosis, modification and tuning information is provided to help you debug your application software.

Warning: Do not use this diagnosis, modification, and tuning information as a programming interface because it is subject to change.

Trademarks and service marks

The following terms are trademarks or registered trademarks of International Business Machines Corporation in the United States or other countries, or both:

i5/OS
IBM
the IBM logo
AIX
CICS
CrossWorlds
DB2
DB2 Universal Database
Domino
IMS
Informix
iSeries
Lotus
Lotus Notes
MQIntegrator
MQSeries
MVS
OS/400
Passport Advantage
SupportPac
WebSphere
z/OS

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both. MMX, Pentium, and ProShare are trademarks or registered trademarks of Intel Corporation in the United States, other countries, or both. Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both. Linux is a trademark of Linus Torvalds in the United States, other countries, or both. Other company, product or service names may be trademarks or service marks of others.

WebSphere Business Integration Server Express and Express Plus include software developed by the Eclipse Project (http://www.eclipse.org/).

WebSphere Business Integration Server Express, Version 4.4, and WebSphere Business Integration Server Express Plus, Version 4.4

Index

IBM ®

Printed in USA