



Microsoft Dynamics® AX

# Implementation guide for Commerce Data Exchange

White Paper

This document describes recommended patterns and practices for setting up, configuring, customizing, monitoring, and diagnosing Commerce Data Exchange: Synch Service and Commerce Data Exchange: Real-time Service.

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<http://www.microsoft.com/dynamics/ax>

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## Introduction

This white paper provides information and resources to help you successfully deploy and configure Microsoft Dynamics AX 2012 R2 Commerce Data Exchange. It addresses deployment planning, hardware configuration, software installation, configuration, customization, best practices, monitoring, and troubleshooting.

## Commerce Data Exchange: Synch Service

### Introduction and overview

Microsoft Dynamics AX for Retail Commerce Data Exchange: Synch Service is the integrated service that periodically replicates data between the head office database and store databases, and among store databases.

Synch Service aggregates data into the fewest packages possible and multicasts them, updating multiple recipients with information such as price changes while minimizing network load.

Synch Service runs as a Microsoft Windows service that listens for incoming requests or packages. If the service receives a read instruction, it connects to the source database, reads data, and stores the data in a data package file. All data transfer requests, such as requests to send data to a store or upload point of sale (POS) sales transactions, are initiated by Microsoft Dynamics AX for Retail Scheduler, whereas Synch Service supplies the data transfer mechanism.

A package can contain data from more than one database table. After the requested data has been read, what happens next depends on how your organization's Synch Service instances are configured.

In a basic configuration, as described in [Deployment topologies for Retail](#), Synch Service at the head office takes data from Microsoft Dynamics AX, creates the data package, and sends it to the store. Synch Service at the store then inserts the data in the appropriate database.

In a forwarder configuration, as described later in this document, Synch Service forwards the package to another instance of Synch Service. The forwarder configuration is used for load balancing, resulting in better performance and scalability.

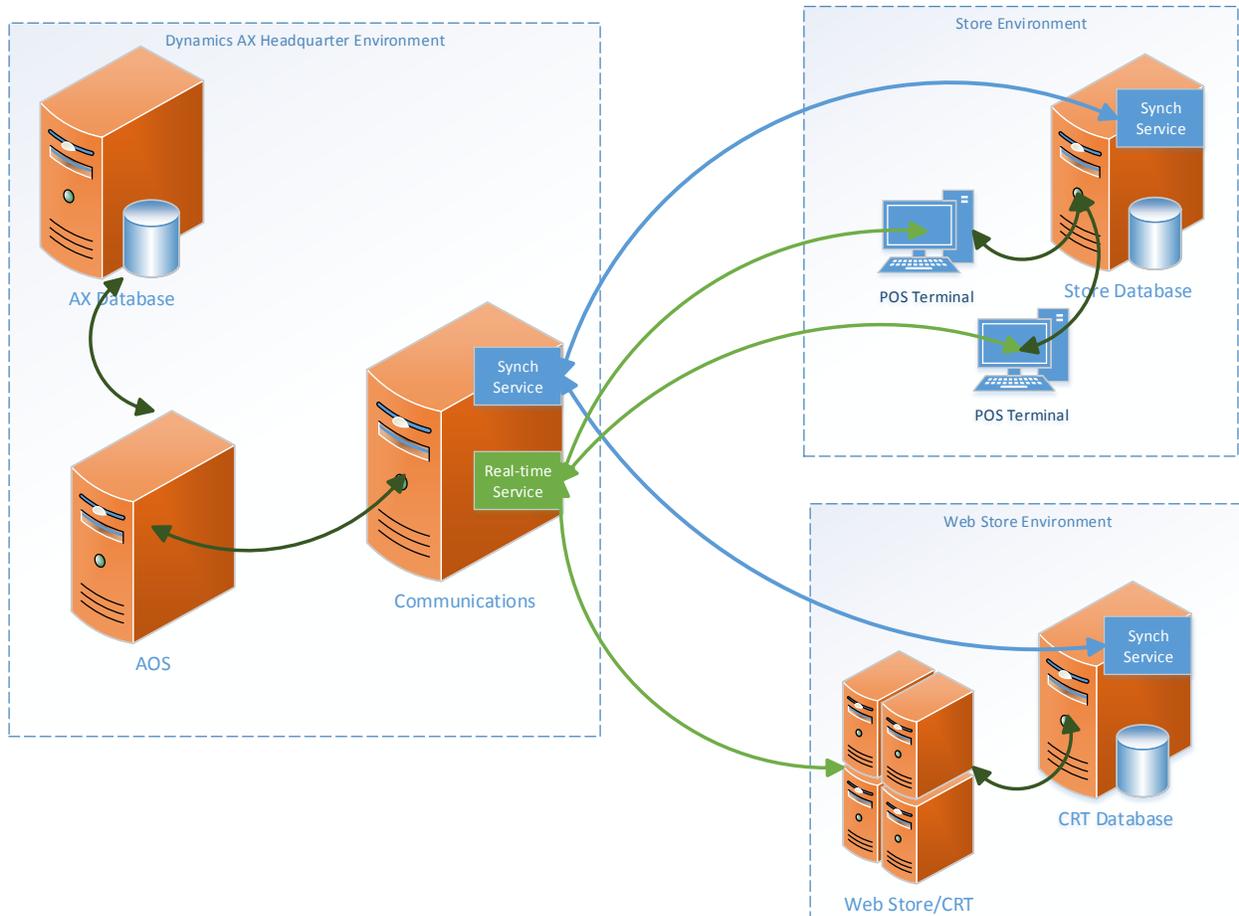
You can also distribute the communication load at the head office by running multiple head office instances of Synch Service. For more information about this configuration option, see the [Advanced installation options for Synch Service](#) section.

The following table lists the subcomponents of Synch Service.

Subcomponent	Description
Synch Service	Synch Service (DBServer.exe) is the data replication service. It handles data transfer between Retail databases at the head office and in the stores.
Synch Service Settings	Synch Service Settings (DBServerUtil.exe) is the configuration utility for Synch Service. It starts the Synch Service Settings Wizard, where you can enter information to configure an instance of Synch Service.
Synch Service Pack Viewer	Pack Viewer (DDPackView.exe) is a tool for inspecting the data included in the packages that Synch Service sends and receives.
Transaction Automation Client	The Transaction Automation Client (TransAutomClient.dll) is a .NET feature that manages communication between Microsoft Dynamics AX and Synch Service. <b>Note:</b> TransAutomClient.dll is a prerequisite for Retail Headquarters. This means that Synch Service must be installed on all instances of Application Object Server (AOS) and on each client computer, even if you do not intend to use those particular instances of Synch Service.

## Deployment topology

The following diagram illustrates the deployment topology.



## Implementation planning

For information about planning, see the [Microsoft Dynamics AX 2012 Implementation Planning Guide](#), which provides guidance to system architects, consultants, and IT professionals involved with planning a Microsoft Dynamics AX 2012 implementation. Topics include the Microsoft Dynamics AX 2012 architecture, implementation methodology, and hardware and software requirements and planning. This document includes information for Microsoft Dynamics AX 2012 R2.

## Hardware and software requirements

For information about system requirements, see [Microsoft Dynamics AX 2012 System Requirements](#), which provides information about the hardware and software requirements for Microsoft Dynamics AX 2012. Before installing Microsoft Dynamics AX, make sure that the system you are working with meets or exceeds the minimum hardware and software requirements.

## Network configuration

To help secure communications between Microsoft Dynamics AX (at the head office) and retail channels, a virtual private network or Internet Protocol security (IPsec) is required to help protect the data being transmitted over the Internet, if the computers for the retail channel are not on the same secure network as the server where Microsoft Dynamics AX is installed.

### Configuring or bypassing IPsec

Synch Service requires a specific IPsec encryption and authentication configuration. The next section provides instructions for setting up this minimum configuration. If you use another method to secure data transport, such as a virtual private network (VPN), you can bypass the IPsec requirement for Synch Service, as described in the [Bypass the IPsec requirement \(with a VPN\)](#) section.

### Configure IPsec (no VPN)

This procedure must be completed on every computer where Synch Service is installed, including the AOS computer and all Microsoft Dynamics AX client computers.

**Note:** On computers that are on a domain, domain policies override the local policies described in this section. Consult the domain administrator to determine whether you have to complete this procedure.

1. Click **Start > Administrative Tools > Local Security Policy**. You can also open Local Security Policy by typing **secpol.msc** in the search or **Run** box.
2. Right-click **IP Security Policies on Local Computer**, and then click **Create IP Security Policy**.
3. In the IP Security Policy Wizard, provide the requested information. On the **Requests for Secure Communication** page, clear the **Activate the default response rule** check box. On the final page of the wizard, select the **Edit properties** check box, and then click **Finish**.
4. In the **Properties** dialog box for the policy, clear the **Use Add Wizard** check box, and then click **Add**.
5. In the **New Rule Properties** dialog box, on the **IP Filter List** tab, click **Add**.
6. In the **IP Filter List** dialog box, type a name for the filter, clear the **Use Add Wizard** check box, and then follow these steps:
  - a. Click **Add**.
  - b. On the **Addresses** tab, select **Any IP Address** in both fields.
  - c. On the **Protocol** tab, select **TCP**, select **From** for any port, select **To** for this port, and then type the port number that you specified as the server port for Synch Service communications. By default, the port number is 16750.
  - d. On the **Description** tab, type a name for this filter, and then click **OK**.
  - e. Click **OK** twice to close the **IP Filter List** dialog box.
7. On the **IP Filter List** tab, select the new filter list.
8. In the **New Rule Properties** dialog box, on the **Filter Action** tab, clear the **Use Add Wizard** check box, and then click **Add**.
9. In the **New Filter Action Properties** dialog box, follow these steps:
  - a. On the **General** tab, type a name for the filter action.
  - b. On the **Security Methods** tab, select **Negotiate security**, click **Add**, select **Integrity and encryption**, and then click **OK**.
  - c. Click **OK**.
10. On the **Filter Action** tab, select the new filter action.

11. In the **New Rule Properties** dialog box, on the **Authentication Methods** tab, click **Add**.
12. Select the authentication method to use, specify any required settings, and then click **OK**.
13. Select the new authentication method, click **Move Up** until the new method is at the top of the list, and then click **Close**.
14. In the **New IP Security Policy Property** dialog box, click **OK**.
15. In the **Local Security Policy** console, right-click the new policy, and then click **Assign**.

### **Bypass the IPsec requirement (with a VPN)**

If you use a method other than IPsec to help secure data transport, such as a VPN, you can bypass the IPsec requirement in Synch Service.

1. In Microsoft Dynamics AX, click **Retail > Setup > Retail scheduler > Channel integration > Commerce Data Exchange: Synch Service profiles**. Select the profile for which to bypass IPsec, select **Disable IPsec**, and then click **Close**.
2. On the Synch Service computer, run Synch Service Settings (**Start > All Programs > Microsoft Dynamics AX 2012 > Commerce Data Exchange: Synch Service > Commerce Data Exchange: Synch Service Settings**) as an administrator, click **Next** until you reach the **Synch Service Properties** page, select **Disable IPsec**, and then click **Close**.

### **Open the firewall**

To establish communications between computers in the organization, you must open the firewall on any computer where Synch Service is installed.

1. On the head office communications server, open the firewall to Synch Service.
2. On the store communications server, open the firewall to Synch Service.

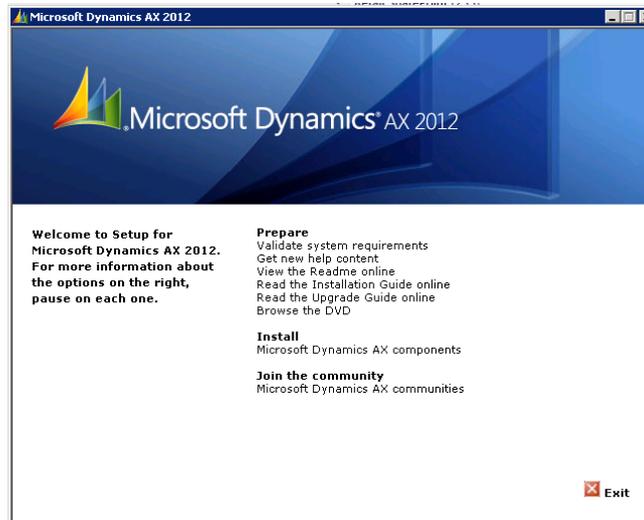
For instructions, see the [PCI Implementation Guide](#).

### **Install Synch Service**

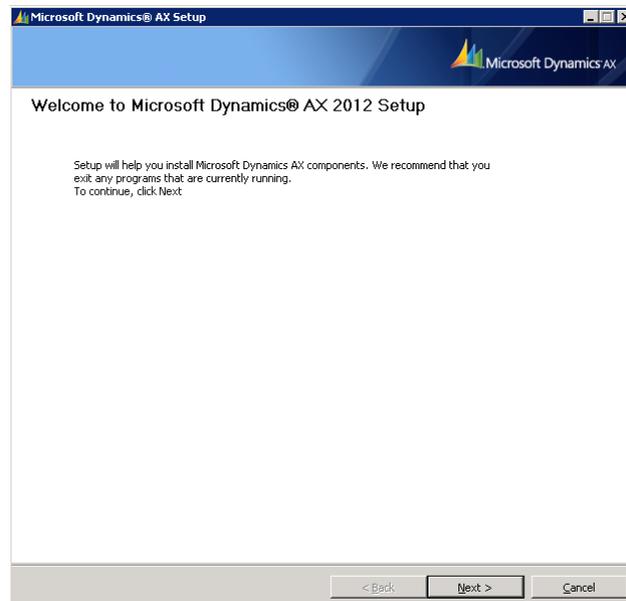
After you have downloaded a copy of Microsoft Dynamics AX 2012 R2 from the [PartnerSource](#) website (logon required), follow these steps to install Synch Service. These steps must be repeated on all computers on which the service needs to be installed.

1. Open the folder where you have downloaded Microsoft Dynamics AX 2012 R2.

2. Right-click the setup file, and then click **Run as administrator**.  
The Microsoft Dynamics AX 2012 R2 installation form opens.

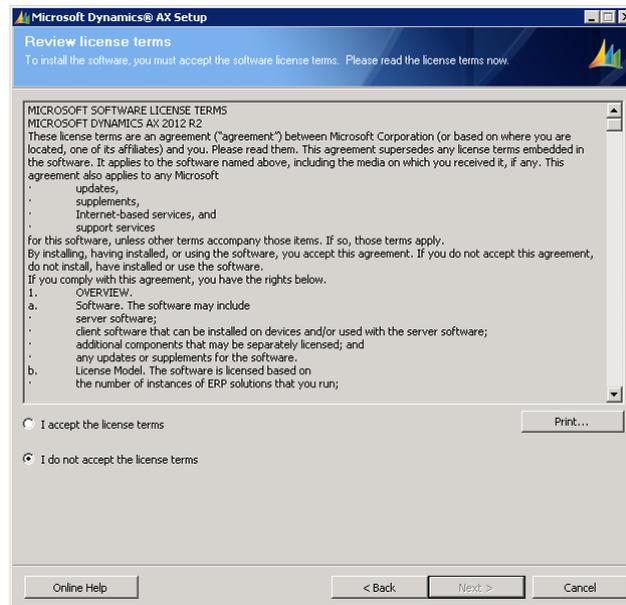


3. Under **Install**, click **Microsoft Dynamics AX components** to select the components to install.  
The Microsoft Dynamics AX 2012 Setup wizard opens.

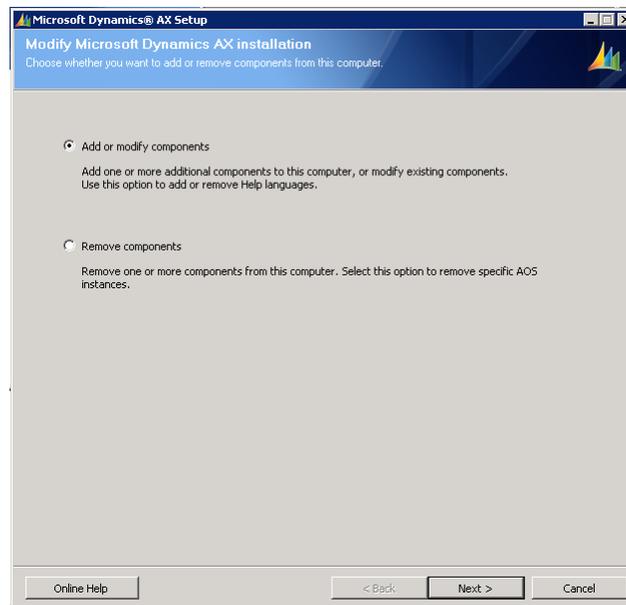


4. Click **Next** to continue the installation.

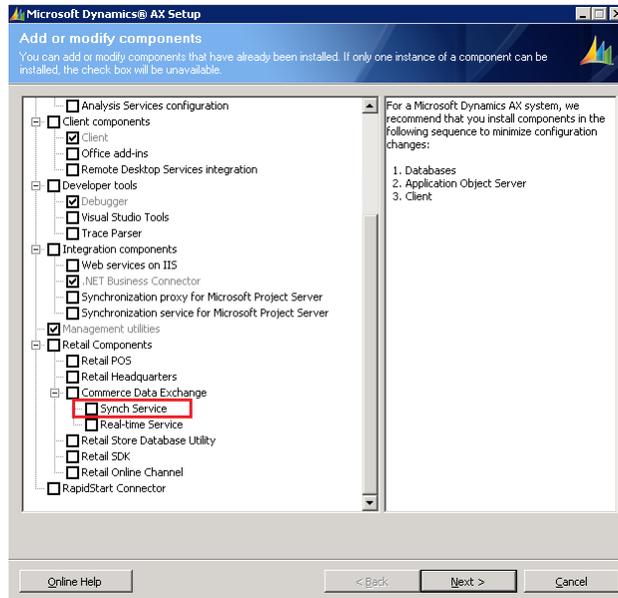
5. Click **I accept the license terms** to continue the installation.



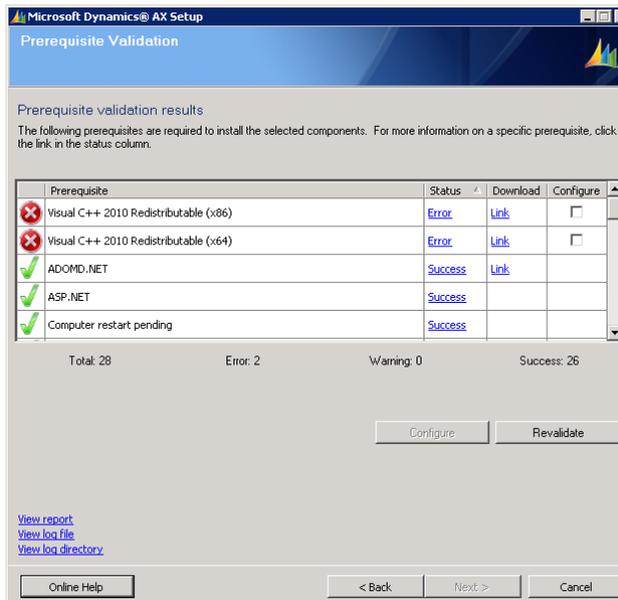
6. The next page provides options for adding and modifying components, and for removing components. Select **Add or modify components**, and then click **Next**.



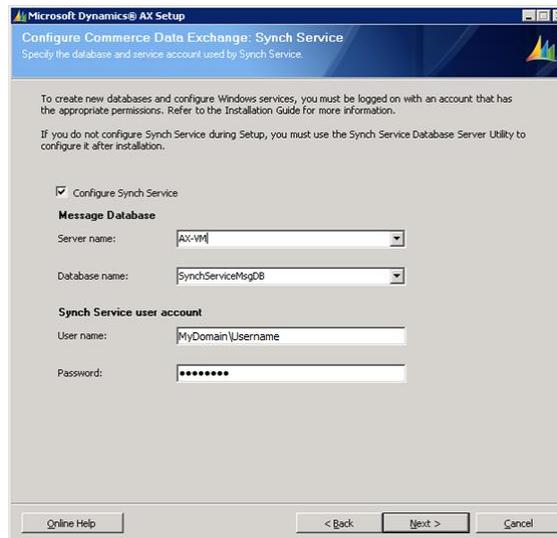
- Under **Retail Components > Commerce Data Exchange**, select **Synch Service**. When installing at the head office, you should also select **.NET Business Connector**.



- Prerequisite validation runs and checks that all the dependencies for installing the selected components are met. If any errors are displayed, click the link to download and install the prerequisites.



9. Click **Next**. The Synch Service configuration page opens.

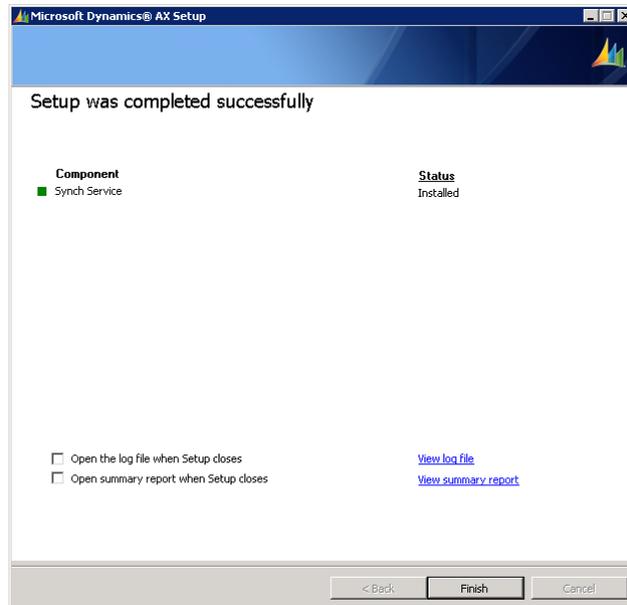


If you select the **Configure Synch Service** check box, you are required to create a message database for Synch Service and specify an account to run it. Otherwise, you can use the Synch Service Settings tool to do this after installation.

10. Enter information in the following fields.

Field	Description
Server name	The computer that hosts the SQL Server instance on which the Synch Service message database is created.
Database name	The name of the message database for Synch Service.
User name	The user account to use to run Synch Service. If Synch Service is installed at the head office, the account must be a valid Microsoft Dynamics AX user. To check whether a domain account is a valid Microsoft Dynamics AX user, go to <b>System administration &gt; Common &gt; Users &gt; Users</b> . If Synch Service is set up to run on the retail channel side, use a valid user account on the computer that runs the Synch Service instance. The account that you select must have read and write permissions to the channel database.
Password	The password for the user account.

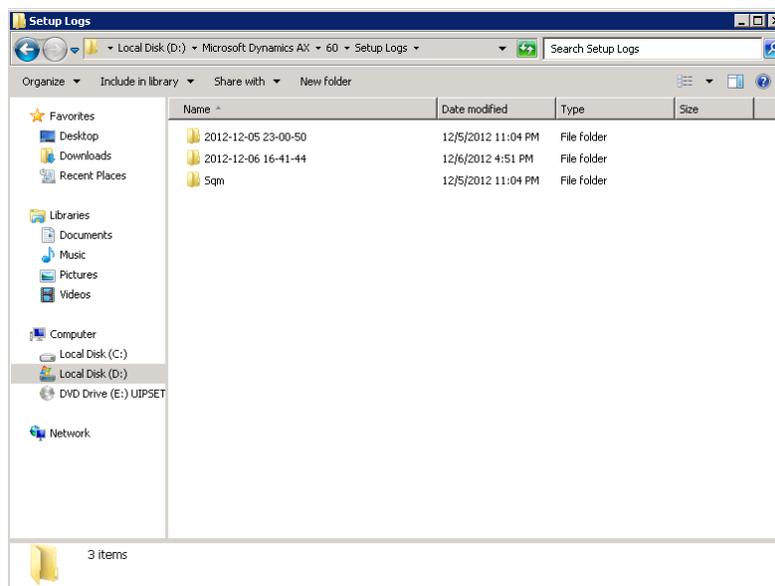
11. Click **Next**, and then follow the rest of the wizard pages to install Synch Service, create the service, and create the message database.



### Troubleshoot the installation

On the final page of the wizard, click the **View log file** link to see what happened during the installation process.

The setup logs are located in a time-stamped folder that you can find under the Setup Logs folder under the installation folder.

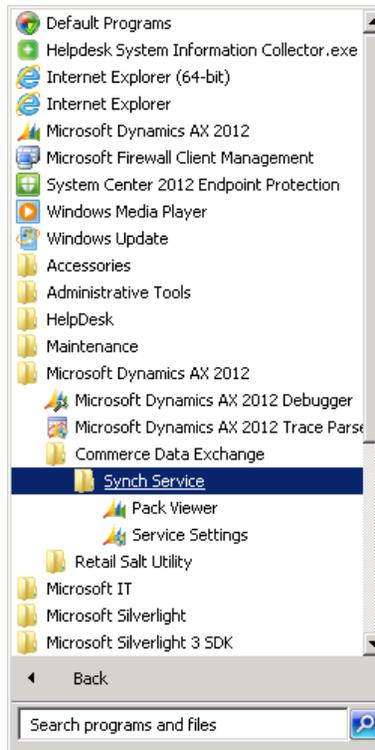


## Create an instance of Synch Service

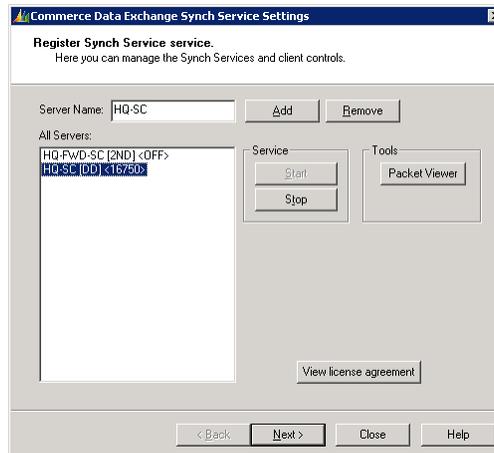
If no service instances were created during installation, the Synch Service Settings tool can be used to set up service instances and configure other properties of the service.

1. Start the Synch Service Settings tool by clicking **Start > All Programs > Microsoft Dynamics AX 2012 > Commerce Data Exchange > Synch Service > Service Settings**.

**Note:** Administrator privileges are needed to run the Synch Service Settings tool.



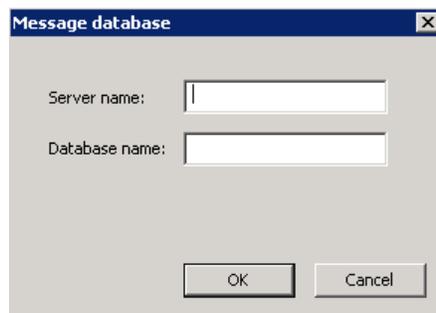
When you start the tool, the following dialog box opens.



The following table describes the controls that are available.

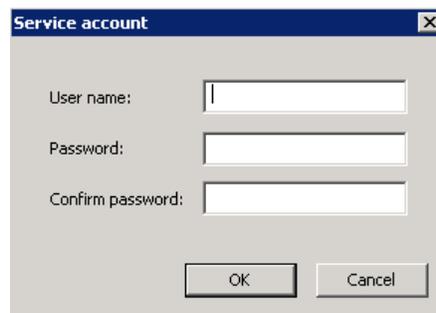
Control	Description
Server Name	The service instance that you are configuring.
Add	Create a new instance by using the name entered in the <b>Server Name</b> field.
Remove	Delete the instance entered in the <b>Server Name</b> field.
All Servers	Display all existing service instances on the local computer. Select an instance to configure it.
Start	Start the selected service instance.
Stop	Stop the selected service instance.
Packet Viewer	Open Synch Service Pack Viewer.
View license agreement	Display the applicable license information.

2. Click **Add**. The following dialog box opens.



3. In the **Server name** field, enter the name of the computer that hosts the SQL Server instance on which the Synch Service message database is created. In the **Database name** field, enter the name of the Synch Service message database. Then click **OK** to create the message database.

The following dialog box opens.



4. Configure the service account.

In this dialog box, you specify an account to run the Synch Service instance. If this instance of Synch Service is installed at the head office, the user account must be a valid Microsoft Dynamics AX user account.

5. Click **OK** to finish creating the service. The service is started by default.

- The newly created service appears in the left pane on the home screen of the Synch Service Settings tool. Select the service.

## Configure Synch Service settings

After you register a new Synch Service instance, follow these steps to configure it.

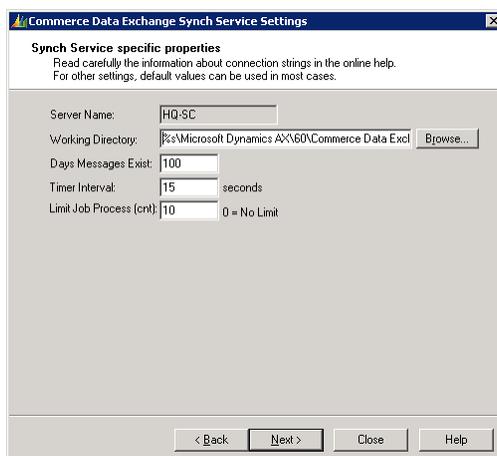
- Select a specific Synch Service instance, and then click **Next**. The following configuration page for the service opens.

- Configure the properties of the selected instance of Synch Service.

The following table describes the controls that are available.

Control	Description
Server Name	The name of the selected service instance. This is a read-only field.
Packet Owner	The name of the service that creates the data packages. This setting is available only if <b>2nd Stage Commerce Data Exchange Synch Service</b> is selected in the <b>Server Mode</b> field.
Server Mode	The mode that this instance of Synch Service is running in. If this instance is a primary instance, select <b>Commerce Data Exchange: Synch Service</b> . If this instance is a forwarder instance, select <b>2nd Stage Commerce Data Exchange Synch Service</b> . For more information about forwarder mode, see the <a href="#">Set up a forwarder instance of Synch Service section</a> .
Server Port	The listening port for Synch Service. This setting is not available for a forwarder instance, because in that case, the service only forwards packages. If you plan to run more than one instance of the service on the same computer, you must change the port values so that they do not conflict with other services.
Off	Turn the server listening port on or off. (We do not recommend that you turn the port off.)
Telnet Port	The port used by the Synch Service Telnet interface. This feature lets you use Telnet to monitor the status of Synch Service. If you also run a Telnet server on the computer, assign the Synch Service Telnet interface to another port to avoid conflicts.

- Click **Next**. The following configuration page opens.



- Configure the Synch Service connection, and how incoming and outgoing messages are handled.

On this page, you need to specify the path of the working directory that keeps temporary files. This directory keeps queue files by default, and it keeps data package files if you select the **Keep Package Files** check box in the **Server debugging properties** window.

**Note:** In the **Working Directory** field, **%s** typically corresponds to the directory C:\Users\\AppData\Local.

The following table describes the fields that are available.

Field	Description
Server Name	The name of the service instance that you are configuring.
Working Directory	The path of the folder where Synch Service keeps temporary files and, if it is configured to do so, package files. To change this path, click <b>Browse</b> .
Days Messages Exist	The number of days to keep processed incoming or outgoing messages. If you type a value of <b>0</b> in this field, messages are not deleted.
Timer Interval	The interval at which Synch Service checks for packages that must be reprocessed because of communication errors.
Limit Job Process (cnt)	The maximum number of job records that Synch Service processes per connection. The number should be set lower when the average package size is high and higher when the average package size is low. To disable the feature (not recommended), enter a value of <b>0</b> .  This feature guarantees that Synch Service continues processing, even if it has a heavy load that would typically cause it to stop responding. Also, when this feature is on, if the first job record in the batch has an error, the rest of the packages are skipped for the run.

- Click **Next**. The following configuration page opens.

- Configure how connections are handled.

The following table describes the fields that are available.

Field	Description
Server Name	The name of the service instance that you are configuring.
Hold Connections	The number of connections to the source database that Synch Service should reserve.
Idle Conn. Time	The number of idle minutes before the reserved connections time out and are released.
Thread Timeout	The number of seconds before threads used in connections to remote locations time out.
Max. Forw. Threads	The maximum number of threads that can be used concurrently to send packages.
Max Hop Counter	The maximum number of transfers, per package, between instances of Synch Service. This setting prevents infinite loops that can result from a misconfigured Synch Service instance.
Socket Timeout	The number of seconds that Synch Service waits for the network to finish a particular send or receive operation. To prevent Synch Service from shutting down merely because it is waiting for the network, set this value lower than the value in the <b>Thread Timeout</b> field.
Retry interval	The interval before a failed connection is retried.
Maximum retries	The number of attempts before Synch Service stops trying to perform an operation on a package.
Forw. Attempts	The maximum number of attempts that Synch Service makes to forward a packet. This setting works only on a forwarder instance.
Use Processor	The processor that the service should run on. If you want the operating system to allocate processors based on need, select <b>All Processors</b> .

Field	Description
Disable IPsec	Select this check box to bypass the IPsec requirements of Synch Service. For more information, see the <a href="#">Bypass the IPsec requirement (with a VPN)</a> section.  <b>Note:</b> If the <b>Disable IPsec</b> check box is selected for a location in Retail Scheduler, the <b>Disable IPsec</b> check box in Synch Service Settings should be selected for all instances of Synch Service that are involved in communication with that location.
Prefer IPV6	Use the IPV6 communication protocol, if it is enabled.

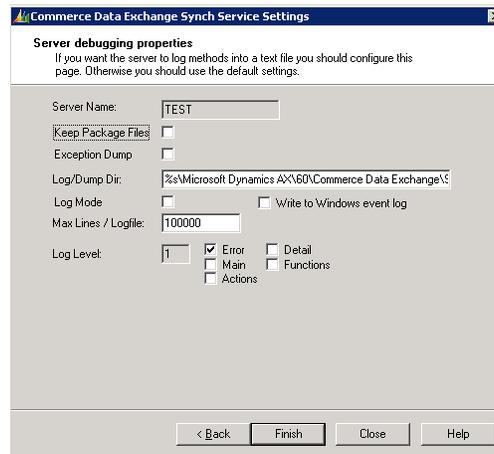
7. Click **Next** to go to the final page in the wizard.

**Note:** After creating and configuring an instance of Synch Service, you can verify its configuration string in the registry, at **HKEY\_LOCAL\_MACHINE\SOFTWARE\Wow6432Node\Microsoft\Dynamics\6.0\Retail Store Connect\Servers\<InstanceName>**.

## Configure Synch Service logging

The final page in the Synch Service Settings wizard is critical in helping debug potential issues with the service and message processing.

Use this page of the wizard to configure what information is logged for each package, and how log files are handled.



The following table describes the fields that are available.

Field	Description
Server Name	The name of the service instance that you are configuring.
Keep Package Files	A selected check box indicates that Synch Service does not delete the temporary package files in the working directory. Do not leave this feature enabled for long, because it could cause you to run out of disk space and prevent Synch Service from operating correctly.
Exception Dump	A selected check box indicates that a memory dump file is created if Synch Service stops working suddenly.
Log/Dump Dir	The folder where log files are saved. Confirm that the folder that you specify actually exists.

Field	Description
Log Mode	A selected check box indicates that Synch Service operations are logged as specified by the <b>Log Level</b> setting.
Write to Windows event log	A selected check box indicates that Synch Service writes the logging data to the Windows event log.
Max Lines / Logfile	The maximum number of lines in each log file. Synch Service creates three log files, rotating to the next log file when the maximum number of lines has been reached. On startup, Synch Service makes a copy of the old log files by appending .old to their names. This means that if the service has been set to automatically restart on failure, the failure appears in the old log files.
Log Level	<p>The amount of error logging that takes place. Generally, the <b>Error</b> and <b>Main</b> logging levels are sufficient, but greater detail might be helpful in some cases. The following levels are available:</p> <ul style="list-style-type: none"> <li>• <b>Error</b> – All errors reported from Synch Service are logged.</li> <li>• <b>Main</b> – The main operations in Synch Service are logged.</li> <li>• <b>Actions</b> – Detailed information about operations in Synch Service is logged.</li> <li>• <b>Detail</b> – Very detailed information about operations in Synch Service is logged.</li> <li>• <b>Functions</b> – Highly detailed and technical information about operations in Synch Service is logged. (This option is intended for developer use only.)</li> </ul> <p><b>Important:</b> Logging as specified in the <b>Log Level</b> settings can take place only if the <b>Log Mode</b> check box is selected.</p>

## Advanced installation options for Synch Service

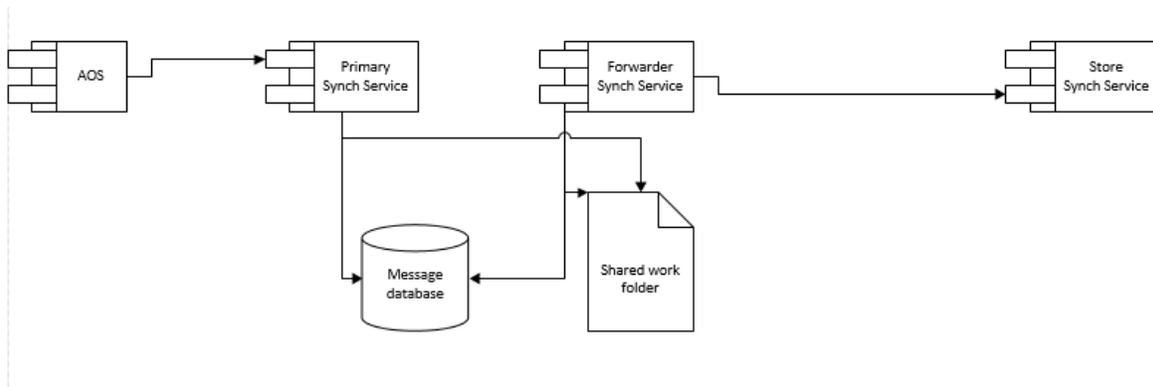
The following sections describe several advanced deployment options. To distribute the load of Synch Service, you can set up a forwarder instance of Synch Service.

### Set up a forwarder instance of Synch Service

A second instance of Synch Service operating in forwarder mode can be used to reduce the processing load on the primary Synch Service server. When your topology includes a forwarder, data packages are cached in the database and working directory, where they are picked up by the forwarder and transmitted to their destination. This might be desirable if the network route to a destination store is slow, or if you want to multicast identical data packages to several stores, because it does not tie up resources on the primary Synch Service instance. Forwarder is also known as Second Stage Synch Service.

To use Synch Service in forwarder mode, you must run two instances of Synch Service at the head office, one as the primary instance and the other as the secondary instance. Set up the forwarder instance on a separate computer, and confirm that the message database where the incoming and outgoing message tables are stored is accessible from there. Also confirm that the working folder is accessible.

The following diagram illustrates a forwarder configuration.



The forwarder instance handles communication in only one direction, from the head office to the store locations.

The name that you assign to the forwarder is the name that you use in the **Database profiles** form to indicate which forwarder should handle a particular location. Use the following procedure to configure a forwarder instance.

In Microsoft Dynamics AX, follow these steps:

1. Open the **Synch Service Profiles** form. (Click **Retail > Setup > Retail scheduler > Channel integration > Commerce Data Exchange: Synch Service profiles.**)
2. Create a new profile, specifying the **Service name** value in the following format:  
 <Forwarder service name>; <receiver service name>  
 This causes the forwarder to send packages to the listed receiver location.
3. Open the **Database profiles** form. (Click **Retail > Setup > Retail scheduler > Channel integration > Database profiles.**)
4. In the **Database profiles** form for any store, in the **Commerce Data Exchange: Synch Service** list, select the newly created profile.
5. Confirm that the user that Synch Service is running as has read/write permissions to the working directory and its contents.

The following screenshot shows a sample profile setup for a forwarder in Microsoft Dynamics AX.

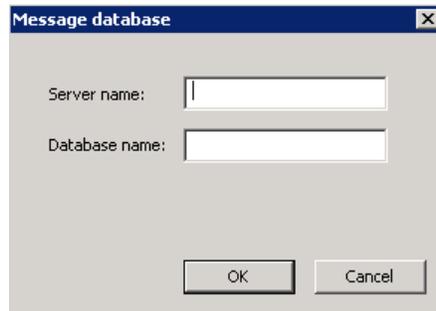
Service name:	HQ-FWD-SC;STORE-SC
Server name:	STORE-VM
Port:	0
Disable IP5ec:	<input type="checkbox"/>
Prefer IPv6:	<input type="checkbox"/>
Timeout (seconds):	0
Commerce Data Exchange: Real-time Service profile:	<input type="text"/>
Commerce Data Exchange: Synch Service upload options:	<input type="text"/>

**Note:** The format of the **Service name** value is <Forwarder service name>; <Receiver service name>.

The server name specifies the computer that hosts the receiver.

After you complete the setup in Microsoft Dynamics AX, you can create and configure the Synch Service instance in forwarder mode by using the Synch Service Settings tool. When you add a forwarder instance, the following dialog boxes open consecutively.

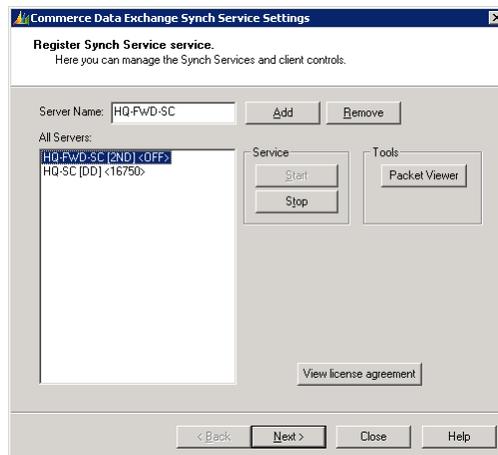
1. In the **Message database** dialog box, assign the message database for the primary Synch Service instance to the forwarder, because the forwarder reads from that message database the location where data packages are temporarily stored.



2. In the **Service account** dialog box, specify an account for running this Synch Service instance.



3. Select the forwarder instance, and then click **Next**.



4. On the next page, in the **Server Mode** field, select **2nd stage Commerce Data Exchange Synch Service**. Notice that the **Server Port** field is automatically disabled for editing, because in forwarder mode, the Synch Service instance only forwards data packages to the destination.

In the **Packet Owner** field, provide the instance name of the primary Synch Service instance that sends data packages to the forwarder.

The screenshot shows the 'Commerce Data Exchange Synch Service Settings' dialog box with the 'Service properties' tab selected. The dialog contains the following fields and values:

- Server Name: HQ-FWD-SC
- Packet Owner: HQ-SC
- Server Mode: 2nd Stage Commerce Data Exchs (dropdown menu)
- Server Port: 16750 (disabled field)
- Telnet Port: 23

At the bottom of the dialog are four buttons: '< Back', 'Next >', 'Close', and 'Help'.

5. On the next page, specify a working directory for the forwarder.

The screenshot shows the 'Commerce Data Exchange Synch Service Settings' dialog box with the 'Synch Service specific properties' tab selected. The dialog contains the following fields and values:

- Server Name: HQ-FWD-SC
- Working Directory: Data Exchange\Synch Service\HQ-FWD-SC\work (with a 'Browse...' button)
- Days Messages Exist: 100
- Timer Interval: 15 seconds
- Limit Job Process (crit): 10 (with '0 = No Limit' text)

At the bottom of the dialog are four buttons: '< Back', 'Next >', 'Close', and 'Help'.

- On the next page, use the default settings if you are not sure what parameter values to use.

The screenshot shows the 'Synch Service Properties' tab of the 'Commerce Data Exchange Synch Service Settings' dialog box. The title bar reads 'Commerce Data Exchange Synch Service Settings'. Below the title bar, the text 'Synch Service Properties' is displayed, followed by the instruction 'It is recommended that the default values are used.' The dialog contains several configuration fields: 'Server Name' (HQ-FWD-SC), 'Hold Connections' (8), 'Idle Conn. Time' (10 minutes), 'Thread Timeout' (10800 seconds), 'Max. Forw. Threads' (20), 'Max. Hop Counter' (2), 'Socket Timeout' (120 seconds), 'Retry interval' (15 seconds), and 'Maximum retries' (100). On the right side, there are fields for 'Forw. Attempts' (1), 'Use Processor' (All Processors), 'Disable IPsec' (unchecked), and 'Prefer IPV6' (unchecked). At the bottom, there are four buttons: '< Back', 'Next >', 'Close', and 'Help'.

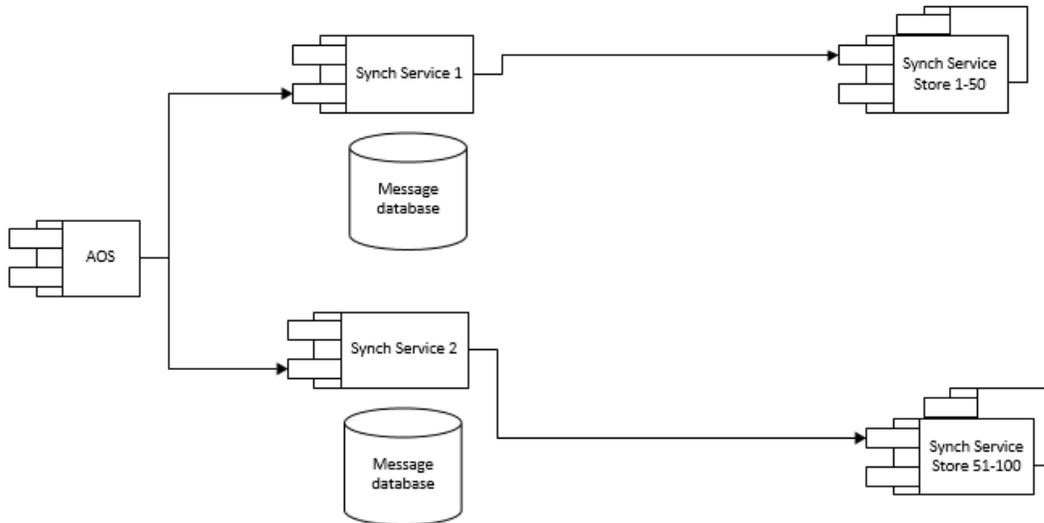
- Specify a log/dump directory, and select any other options that are needed.

The screenshot shows the 'Server debugging properties' tab of the 'Commerce Data Exchange Synch Service Settings' dialog box. The title bar reads 'Commerce Data Exchange Synch Service Settings'. Below the title bar, the text 'Server debugging properties' is displayed, followed by the instruction 'If you want the server to log methods into a text file you should configure this page. Otherwise you should use the default settings.' The dialog contains several configuration fields: 'Server Name' (HQ-FWD-SC), 'Keep Package Files' (checked), 'Exception Dump' (unchecked), 'Log/Dump Dir' (%s\Microsoft Dynamics AX\60\Commerce Data Exchange%), 'Log Mode' (checked), 'Write to Windows event log' (unchecked), 'Max Lines / Logfile' (100000), and 'Log Level' (3). Under 'Log Level', there are checkboxes for 'Error' (checked), 'Main' (checked), 'Actions' (unchecked), 'Detail' (unchecked), and 'Functions' (unchecked). At the bottom, there are four buttons: '< Back', 'Finish', 'Close', and 'Help'.

## Run multiple instances of Synch Service

Instead of using a forwarder instance, you can run additional primary instances of Synch Service as needed at the head office. First, install and configure the new instance of Synch Service. When you configure the new instance, use a different port number, so that there is no conflict between instances.

The following diagram illustrates a configuration with multiple instances of Synch Service.



In Microsoft Dynamics AX, configure the following profiles for each instance of Synch Service:

- A Synch Service profile (**Retail > Setup > Retail scheduler > Channel integration > Commerce Data Exchange: Synch Service profiles**)
- An AOS profile (**Retail > Setup > Retail scheduler > Channel integration > AOS profiles**). For each AOS profile, select a different Synch Service instance. The AOS profiles can use the same AOS instance.

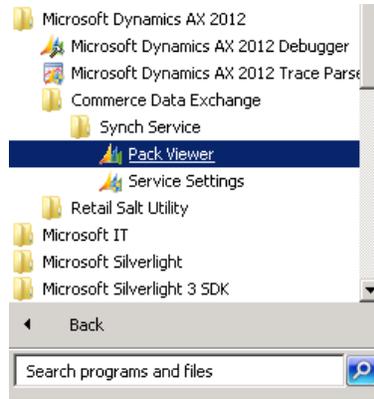
Next, create new distribution schedules (**Retail > Periodic > Data distribution > Distribution schedule**). For example, create a distribution schedule to send items and prices to stores on the west coast. Select a new AOS profile and select the distribution location list that represents stores on the west coast. Add the A-1040 (products) and A-1020 (discounts) jobs to the distribution schedule. Repeat this step for other regions.

## Synch Service Pack Viewer

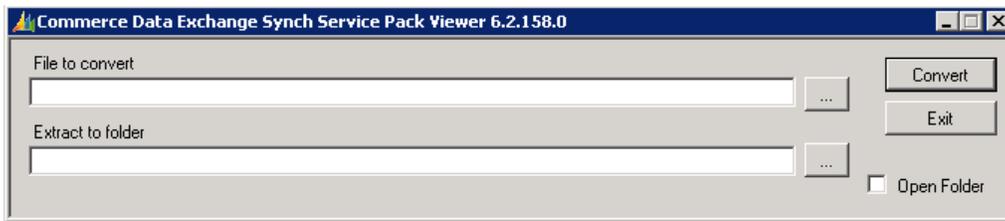
Pack Viewer is a tool that helps you to examine the data in the packages that Synch Service sends and receives. A package can contain any of the following:

- The database query being used
- The data to insert
- Both the query and the data

To start Pack Viewer, click **Start > All Programs > Microsoft Dynamics AX 2012 > Commerce Data Exchange > Synch Service > Pack Viewer**.



Pack Viewer is a dialog box that looks as follows.



Pack Viewer converts the package file from binary format into XML files that you can open in Notepad or another text editor. There is one XML file for the header and one for each table included in the package. The files are stored in a folder with the same name as the package.

Package files are available for viewing only if you specify in Synch Service Settings that they should be saved.

Although you can save all packages as a message archive, doing so can consume disk space quickly. Typically, you save packages and use Pack Viewer only as a troubleshooting measure, such as when you are experiencing a synchronization or replication issue.

### Save package files for viewing in Pack Viewer

To save and access Synch Service packages, you need to run Synch Service Settings as an administrator. Select the appropriate instance of Synch Service to configure, and click through the wizard to apply the following settings:

1. On the **Commerce Data Exchange: Synch Service specific properties** page, in the **Working Directory** field, type the path of, or browse to, the folder where you want to save the packages.
2. On the **Server debugging properties** page, select the **Keep Package Files** check box, and then click **Finish**.

For more information, see the [Create an instance of Synch Service](#) section.

## File formats

For the Synch Service instance that connects to Microsoft Dynamics AX, the following file formats are used:

- For A and N jobs:
  - **Incoming message** – Temporary files with the suffix I  
This indicates a database read request sent from Microsoft Dynamics AX to Synch Service.
  - **Outgoing message** – Temporary files with the suffix R  
This indicates a data package sent to Synch Service at the retail channel.
- For Pull jobs (P jobs) that receive retail transaction data from the channel:
  - **Incoming message** – Temporary files with the suffix I  
This indicates a data package sent from the channel.
  - **Outgoing message** – Temporary files with the suffix I  
This indicates a data package sent to Microsoft Dynamics AX.

**Note:** The temporary files have the same suffix, I.

To see the content in a data package by using Pack Viewer, you need to change the suffix from I to R; otherwise, you receive an error message.

For the Synch Service instance that connects to the retail channel database, the following file formats are used:

- For A and N jobs:
  - **Incoming message** – Temporary files with the suffix I  
This indicates a data package sent from Synch Service at the head office.
  - **Outgoing message** – Temporary files with the suffix I  
This indicates data sent to be written into the channel database.

**Note:** To see the content in a data package by using Pack Viewer, you need to change the suffix from I to R; otherwise, you receive an error message.

- For P jobs:
  - **Incoming message** – Temporary files with the suffix I  
This indicates a data upload request sent from Synch Service at the head office.
  - **Outgoing message** – Temporary file with the suffix R  
This indicates a data package sent to Synch Service at the head office.

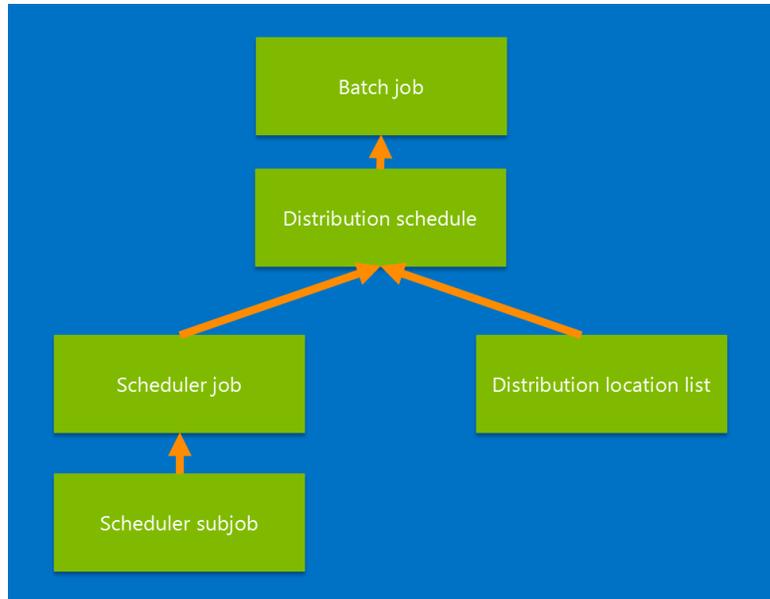
## Set up Retail Scheduler

Retail Scheduler coordinates communication between Microsoft Dynamics AX and stores. Use Retail Scheduler to manage the distribution of data from the head office stores.

Jobs are used to distribute data to the locations. Jobs are made up of subjobs, which are specific instructions for distributing data in selected tables and selected table fields. Each job has a location filter, which is the set of distribution locations to which the data is distributed by the job. A distribution location list is a group of distribution locations. For example, you can set up distribution location lists per region or per time zone.

The distribution schedule is used to run the data transfer, either manually or by scheduling a batch job in Microsoft Dynamics AX. A distribution schedule can be configured to contain one or more

distribution location lists and one or more scheduler jobs. In other words, a distribution schedule can send data to one or more regions, and it can send data for one or more tables. For more information about distribution locations and the distribution schedule, see the [Data distribution settings](#) section.



To run jobs, you must complete the following tasks:

- Initialize jobs and subjobs.
- Configure subjobs.
- Configure jobs.
- Set up distribution locations and distribution schedules.
- Convert pre-actions to actions.
- Run jobs or batches of jobs.

### **Scheduler jobs and subjobs**

A scheduler subjob maps a source table to a destination table, including individual fields. For example, a subjob specifies the Microsoft Dynamics AX table InventTable and the corresponding table InventTable in the Retail POS database. The transfer field list specifies which fields from InventTable are included.

A scheduler job is a grouping of related subjobs. For example, the A-1040 scheduler job contains all subjobs that are related to times.

In Microsoft Dynamics AX for Retail, there are three types of jobs:

- **Action (A) jobs** – A jobs send only changed data from Microsoft Dynamics AX to stores.
- **Normal (N) jobs** – N jobs also send data from Microsoft Dynamics AX to stores. N jobs delete all existing data in the destination tables and then insert the whole set of data.
- **Pull (P) jobs** – Use P jobs to update the data in the Microsoft Dynamics AX database by pulling data, such as sales and inventory transactions, from the stores.

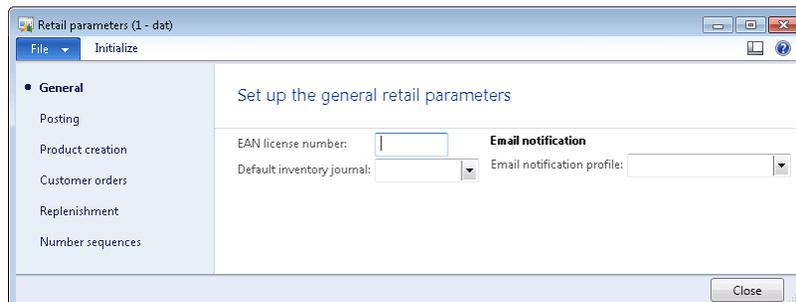
## Initialize default jobs

Microsoft Dynamics AX for Retail comes with predefined scheduler jobs and subjobs that meet the replication needs of most organizations. To populate these jobs and subjobs, you must initialize Microsoft Dynamics AX for Retail.

New jobs can be added or existing jobs can be customized based on business requirements.

The following task is performed during deployment of Microsoft Dynamics AX for Retail and creates the base configuration data, including the scheduler jobs and subjobs.

1. Click **Retail > Setup > Parameters > Retail Parameters**.
2. In the **Retail parameters** form, on the **General** tab, click **Initialize**.

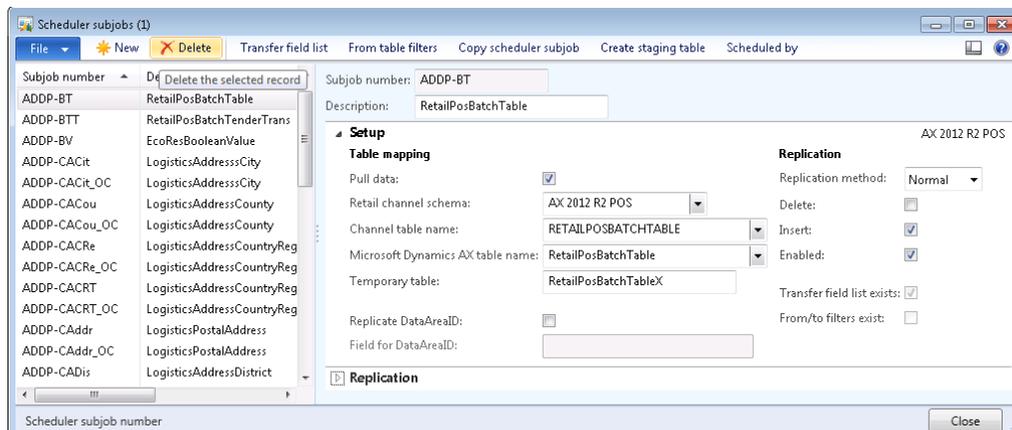


## Create scheduler subjobs

To create and configure a subjob, complete the following procedure.

**Note:** A subjob can be assigned to more than one job.

1. Click **Retail > Setup > Retail scheduler > Scheduler subjob**.
2. Click **New** to create a new subjob, or select the subjob to modify in the list on the left. You can also click **Copy scheduler subjob** to use an existing subjob as a starting point.



3. Enter the subjob number, which is a unique ID that identifies the subjob.
4. Enter a description of the subjob.

5. Select the replication method in the list. The following options are available:
  - **Normal** – Select this method if the subjob is for an N job that sends all data to the retail store.
  - **By actions** – Select this method if the subjob is for an A job that sends only changed data to the retail store.
6. On the **Setup** FastTab, in the **From design** area, select the location number from which to extract the information into Microsoft Dynamics AX.
7. In the **From table** list, select the table from which to retrieve information at the retail channel.
8. In the **To design** area, select the location number to which to push information from Microsoft Dynamics AX.
9. In the **To table** list, select the table into which to populate information at the retail channel.
10. Select the **Replicate DataAreaId** check box to replicate the legal entity ID at the retail channel or the head office.

**Caution:** Use the **Replicate DataAreaId** field with caution, because it can cause invalid data to be populated in the wrong fields.
11. Select the field for DataAreaId in the list.
12. In the **Replication** area, select the replication method in the list.
13. Select the field transfer type in the list. The following options are available:
  - **All distribution locations** – The data flows to all the retail stores.
  - **Include list** – The data flows to the retail stores specified in the include list.
  - **Exclude list** – The exclude list is the fields that are not selected in the transfer field list.
14. Select the **Delete** check box if replication is performed when a record is deleted.
15. Select the **Insert** check box if replication is performed when a record is created.
16. Select the **Enabled** check box to activate the subjob.
17. Select the **Pull data** check box to indicate that the job needs to pull data from retail stores to the head office. If you select this option, you must select a replication method of **Normal**.

The **Transfer field list exists** check box is automatically selected if transfer fields are specified for the table that is replicated to the retail store.

The **From/To filters exist** check box is automatically selected if filters are specified for the tables selected in the subjob.
18. On the **Replication** FastTab, in the **Actions** area, enter the action counter interval. A value can only be entered if **By actions** is the replication method.
19. In the **Replication counters** area, enter the replication counter value.
20. Select the replication counter interval.

## Transfer field list

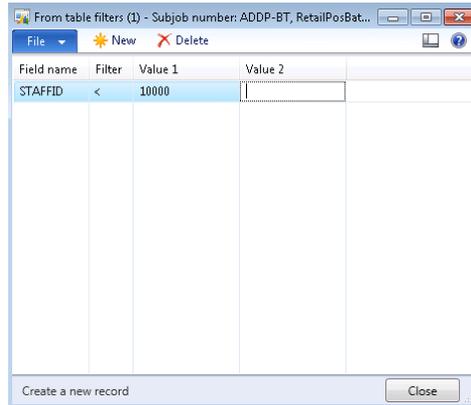
1. Open the scheduler subjob by clicking **Retail > Setup > Retail scheduler > Scheduler subjob**.
2. Select the subjob in the list on the left, and then click **Transfer field list** to select the fields that are distributed to the retail stores. The **Field list** form opens.

From field	Field type	To field	Field type	Conversion type	Conversion value
BATCHID	Int64	BatchID	Int64	None	
CLOSEDATE	Date	CloseDate	Date	None	
CLOSEDATETIMEUTC	DateTime	CloseDateTimeUtc	DateTime	None	
CLOSETIME	Integer	CloseTime	Integer	None	
CUSTOMERSCOUNT	Integer	CustomersCount	Integer	None	
DATAAREAD	Text	DataAreaId	Text	None	
DISCOUNTTOTAL	Decimal	DiscountTotal	Decimal	None	
LOGONSCOUNT	Integer	LogonsCount	Integer	None	
NOSALECOUNT	Integer	NoSaleCount	Integer	None	
PAIDTOACCOUNTTOTAL	Decimal	PaidToAccountTotal	Decimal	None	
REPLICATIONCOUNTER	Integer	ReplicationCounter	Integer	None	
RETURNSTOTAL	Decimal	ReturnsTotal	Decimal	None	
ROUNDEDAMOUNTTOTAL	Decimal	RoundedAmountTotal	Decimal	None	
SALESCOUNT	Integer	SalesCount	Integer	None	
SALESTOTAL	Decimal	SalesTotal	Decimal	None	
STAFFID	Text	StaffId	Text	None	
STARTDATE	Date	StartDate	Date	None	
STARTDATETIMEUTC	DateTime	StartDateTimeUtc	DateTime	None	
STARTTIME	Integer	StartTime	Integer	None	
STATUS	Integer	Status	Option	None	
STOREID	Text	StoreId	Text	None	

3. Select the from field in the list. The field type is automatically selected based on the field selection.
4. Select the to field in the list. The field type is automatically selected based on the field selection.
5. Select the conversion type in the list. The following options are available:
  - **None** – Select this option to apply no conversion rules.
  - **Equals (=)** – Select this option to specify the filter value in the **Value** field.
  - **Substring** – Enter the substring value in the **Value** field.
  - **Today()** – Select this option if the filter is based on the current date timestamp.
  - **TimeNow()** – Select this option to populate the current time.
  - **Skip text conversion** – Select this option to skip the conversion process.
  - **Time to integer** – Select this option to convert a time value to an integer.
  - **Integer to time** – Select this option to convert an integer to a time value.

### From table filters

1. Open the scheduler subjob by clicking **Retail > Setup > Retail scheduler > Scheduler subjob**.
2. Select the subjob in the list on the left, and then click **From table filters** to set filters on the selected from table. The **From table filters** form opens.

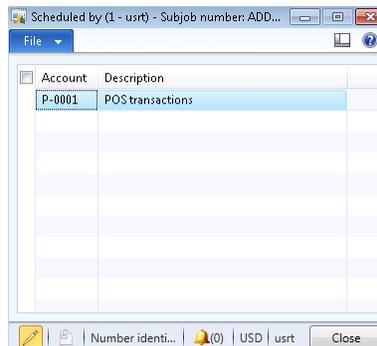


3. Click **New** to create a new filter.
4. Select the field name in the list. A new window opens with a list of fields to select.
5. Select a filter in the list.
6. In the **Value1** field, enter the filter value.
7. In the **Value2** field, enter the filter value.

### Scheduled by information

1. Open the scheduler subjob by clicking **Retail > Setup > Retail scheduler > Scheduler subjob**.
2. Select the subjob in the list on the left, and then click **Scheduled by** to view the scheduler job that runs the subjob.

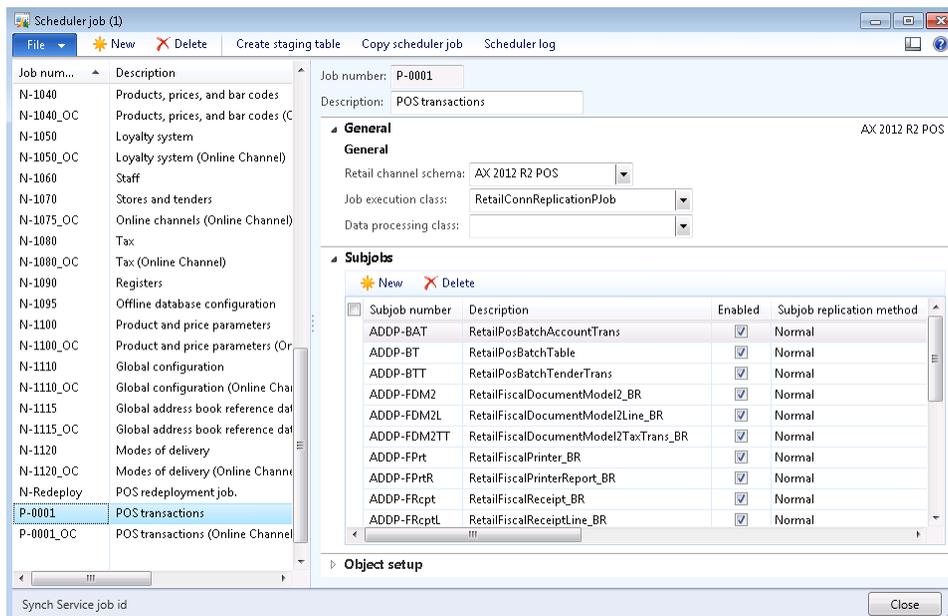
The **Scheduled by** form opens.



## Configure jobs

Jobs should contain subjobs that are related. For example, the Currency job contains subjobs that update currencies and exchange rates. Jobs should also contain subjobs that use replication methods that are consistent with the type of job. As a general rule, N jobs and P jobs should contain subjobs with **Normal** replication, and A jobs should contain subjobs with **By actions** replication.

1. Click **Retail > Setup > Retail scheduler > Scheduler job**.



2. Click **New** to create a new job, or select the job to modify.
3. Enter a unique job number for the new scheduler job.
4. Enter a description of the job.
5. In the **Retail channel schema** field, select the appropriate schema version. The retail schema version is also specified on the subjob. Only subjobs with the same schema should be added to this scheduler job.
6. On the **Subjobs** FastTab, click **Add** to assign subjobs to the scheduler job.  
**Note:** A scheduler job is processed as a SQL transaction. If one subjob fails, all other subjobs in the job will also be rolled back.
7. Select the subjob number in the list. The **Description** field displays the name of the selected subjob.
8. By default, the values on the **Object setup** FastTab are not used.

## Create a temporary staging database for P jobs

This action applies only to P jobs. It will create the temporary tables that are used during data import.

1. Open the scheduler job by clicking **Retail > Setup > Retail scheduler > Scheduler job**.

2. Select the P job in the list on the left, and then click **Create TempDB staging table** to create a staging database for P job tables.

### Copy scheduler job

To use an existing scheduler job as a starting point, copy the job and modify the copy.

1. Open the scheduler job by clicking **Retail > Setup > Retail scheduler > Scheduler job**.
2. Select the job in the list on the left, and then click **Copy scheduler job** to copy an existing job to create a new scheduler job.

### View the scheduler log

Each time a scheduler job is run as part of a distribution schedule, a new GUID is generated and the status is logged. When launched from the scheduler job form, the log information from all distribution schedules this scheduler job belongs to is displayed.

1. Open the scheduler job by clicking **Retail > Setup > Retail scheduler > Scheduler job**.
2. Select the job in the list on the left, and then click **Scheduler log** to view historical information about the job execution.

The scheduler log form opens.

Scheduler log (1) - Job number: P-0001, 302, Job number: P-0001

Log transaction n...	Job number	Error occurred	Start date	Start time	End date	End time	Status message	Message GUID
302	P-0001	<input type="checkbox"/>	4/20/2013	04:33:22 pm	4/20/2...	04:33:23 pm	Successful with Commerce Data Exchange: ...	{4CF17603-D5B0-4...
297	P-0001	<input type="checkbox"/>	4/20/2013	04:10:03 pm	4/20/2...	04:10:39 pm	Successful with Commerce Data Exchange: ...	{6DE19978-088B-4...
296	P-0001	<input type="checkbox"/>	3/11/2013	05:44:10 pm	3/11/2...	05:44:19 pm	Successful with Commerce Data Exchange: ...	{41540AF9-1E32-4...
295	P-0001	<input type="checkbox"/>	3/11/2013	04:31:39 pm	3/11/2...	04:31:40 pm	Successful with Commerce Data Exchange: ...	{0C1544DC-AD23-...
294	P-0001	<input checked="" type="checkbox"/>	3/11/2013	04:31:00 pm	3/11/2...	04:31:02 pm	An error occurred on send - 12288: An error...	{A596A96E-23E9-4...
293	P-0001	<input type="checkbox"/>	3/11/2013	04:25:18 pm	3/11/2...	04:25:19 pm	Successful with Commerce Data Exchange: ...	{46C59DFC-C0DA-...
292	P-0001	<input type="checkbox"/>	3/11/2013	04:19:38 pm	3/11/2...	04:19:40 pm	Successful with Commerce Data Exchange: ...	{BAC9823F-9D36-...
291	P-0001	<input checked="" type="checkbox"/>	3/11/2013	03:04:11 pm	3/11/2...	03:04:48 pm	An error occurred on send - 12288: An error...	{1CEBA0D1-32B1-...
283	P-0001	<input type="checkbox"/>	1/15/2013	09:27:55 am	1/15/2...	09:27:56 am	Successful with Commerce Data Exchange: ...	{E65805D0-C81D-...
280	P-0001	<input type="checkbox"/>	1/15/2013	08:55:26 am	1/15/2...	08:55:27 am	Successful with Commerce Data Exchange: ...	{22A9DAAD-8CD1-...
279	P-0001	<input type="checkbox"/>	1/15/2013	08:51:59 am	1/15/2...	08:52:09 am	Successful with Commerce Data Exchange: ...	{9122A0C2-E0E5-4...

## Data distribution settings

Create data distribution settings to specify whether and how data in the Microsoft Dynamics AX database is sent to store databases. You can specify that certain records are sent only to the locations where those records are applicable. You can also specify whether and how changes to certain tables and table fields are distributed.

Data distribution starts and ends with a record that is changed.

The distribution process consists of the following steps:

1. Set up data distribution locations for stores.
2. Set up action filters to specify which tables and fields, if any, are monitored for changes.
3. Set up table distributions. When a record in one of the selected tables is modified, the distribution settings for the table determine whether that modified record is distributed, and whether records in parent or child tables should be distributed with it.
4. When a record is modified, the appropriate data is sent to the appropriate locations by means of jobs. The settings of the jobs further refine the specifics of the distribution.

## Distribution locations

A distribution location is a record that represents the destination for distributed data. Whenever you create a store, a corresponding distribution location is automatically created. In general, you must have a distribution location for each store location that has its own database.

## Create distribution locations

The distribution locations that are created automatically when you create stores are probably sufficient, but you can also create new distribution locations.

**Note:** If you create a distribution location manually, ensure that the distribution location ID matches the ID for the store that the distribution location represents.

1. Click **Retail > Setup > Retail scheduler > Distribution locations**.
2. In the **Distribution locations** form, click **New**.

Location nu...	Description
HOUSTON	Houston
LONETRE	Lone Tree
LOSANGE	Los Angeles
MIAMI	Miami
MISSION	Mission Viejo
NEWYORK	New York
OAKBROO	Oak Brook
PALOALT	Palo Alto
PHILADE	Philadelphia
S0009	Store 9
S0010	Store 10
SANANTO	San Antonio
SANDIEG	San Diego
SANTACL	Santa Clara
SCOTTSD	Scottsdale
SEATTLE	Seattle
TRON	Tron

Location number: SEATTLE  
Description: Seattle  
Channel: Seattle

**General**

**Database profiles**  
Profile name: SeattleStore

**Channel profile**  
Profile name:

**Data exchange** AX 2012 R2 POS |  
Retail channel schema: AX 2012 R2 POS  
Send data:   
Receive data:   
Continuous data transfer schedule:

Close

3. Complete the following information for each distribution location:

#### Fields

- **Location number** – Enter a unique ID for the distribution location.
- **Description** – Enter a description of the distribution location.
- **Channel** – Select the channel the distribution location is associated with.
- **Database profile** – Select the database connection profile for this location. For a store location, select a database profile.
- **Channel profile** – Available only for online channels. Links to channel-specific properties.
- **Retail channel schema** – The schema that is used by the linked database.
- **Send data** – Available only for online channels. Select this option if data is sent to this location.
- **Receive data** – Available only for online channels. Select this option if data is retrieved from this location.
- **Continuous data transfer schedule** – Available only for online channels. Select the distribution schedule that must be processed even if **Send data** is not selected. For example, no new changes are applicable to this channel database, and **Send data** is not selected, but the on-hand quantity must be sent to the channel.

**Functions** – Open a menu where you can select from the following options:

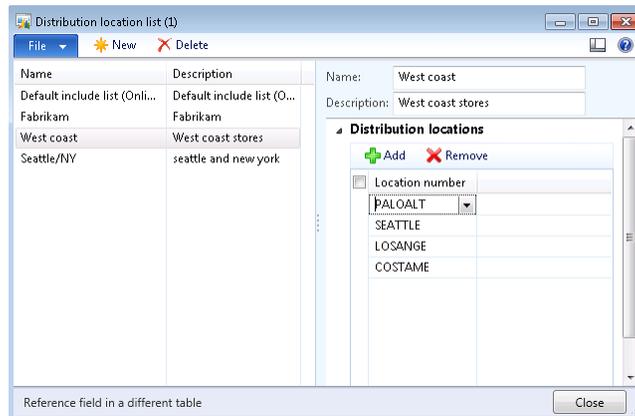
- **Test connection** – Test the connection to the instance of Synch Service that is selected in the connection profile for this location.
- **Read schema** – Read the database schema for the selected location.
- **Send configuration** – Send the Synch Service upload options to the instance of Synch Service that is referenced in the database profile.
- **Deploy initial dataset** – Available only for online channels. This function sends all required data to the channel during initial deployment. When prompted, select the A-0001\_OC distribution schedule.

#### Distribution location list

You can create a distribution schedule that associates one or many locations (distribution location lists) with one or many scheduler jobs.

1. Click **Retail > Setup > Retail scheduler > Distribution location list**.

2. In the **Distribution location list** form, click **New**.

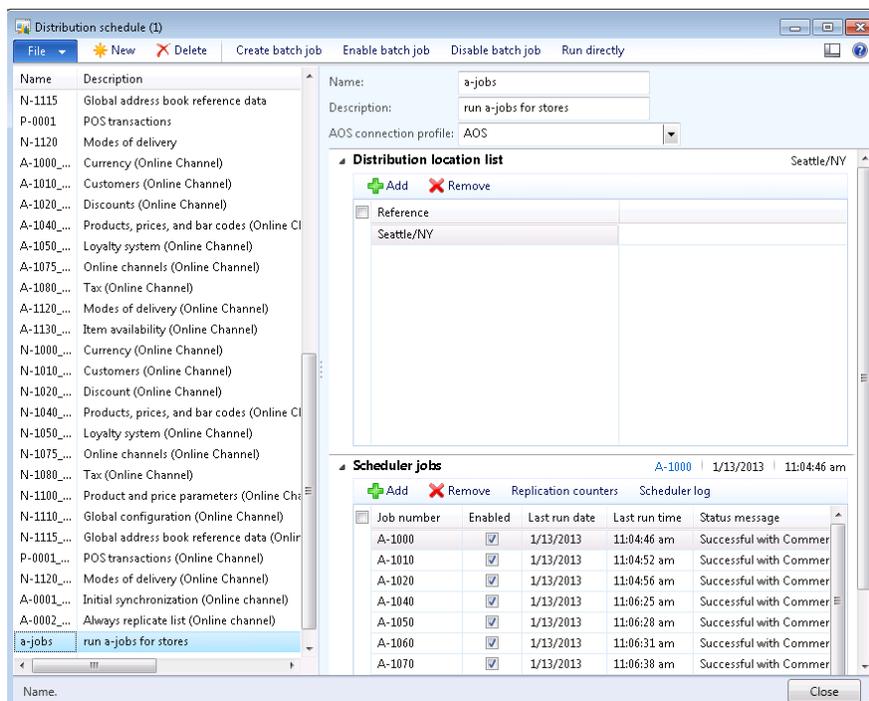


3. Click **Add** to add a new retail channel to the distribution location list.
4. Select the location number in the list.

## Distribution schedule

The distribution schedule links distribution locations lists (where to send the data) with scheduler jobs (which data to send). You can run a distribution schedule manually or you can configure a Microsoft Dynamics AX batch job to run periodically.

1. Click **Retail > Periodic > Data distribution > Distribution schedule**.



2. Enter the following information:

**Name** – Enter a unique identifier for the distribution schedule.

**Description** – Enter a description of the distribution schedule.

**AOS connection profile** – Specify the AOS profile to use to run the distribution schedule. To balance the load, you can define multiple AOS profiles with different Synch Service instances assigned. This will distribute the processing of distribution schedules among all Synch Service instances.

## Preactions and actions

Action jobs (A-jobs) send only the changes since the last run. Microsoft Dynamics AX uses preactions to track those changes. The insert, update, and delete methods for all relevant tables have been modified to create preactions. Preactions are converted to actions in a separate step that uses the table distribution configuration to determine where changes must be sent.

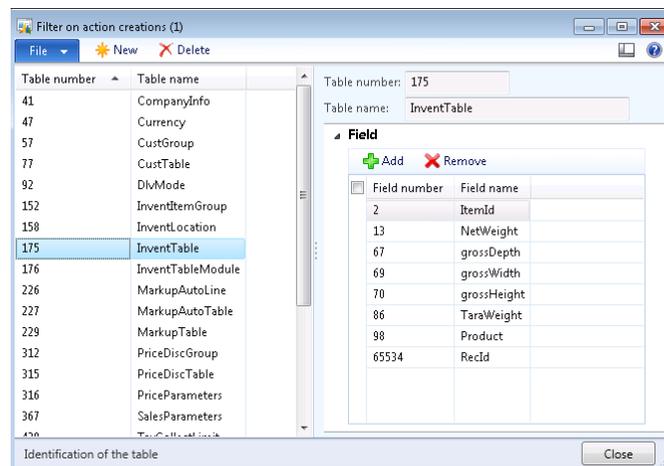
## Filter on action creations

When you set up an action filter, you can watch for transactions that affect specific fields in tables. If an employee creates, modifies, or deletes a record in a selected table, the action filter automatically collects the changed information in a preaction.

If you want to watch for modifications only to specific fields in a table, you can select those fields in the action filter. Do not select specific fields if you want to monitor all changes to a table.

You can create action filters for specific stores.

1. Click **Retail > Setup > Retail scheduler > Filter on action creations**.



2. In the **Filter on action creations** form, click **New** to create a new action filter.

3. Select a table in the list on the left.

4. On the **Field** FastTab, add fields to the list. Preactions are created only for fields in this list. If another field in the table is updated, no preaction is created.

## Table distribution

The table distribution specifies how changes that are made to data are distributed from Microsoft Dynamics AX to channel locations. To use action jobs correctly, you must configure the table distribution.

## Distribution types

The distribution type for a table determines how that table is distributed. The following distribution types are available:

- **All distribution locations** – Distribute modifications to the records in a table to all locations. This is the default distribution type.
- **Same as parent distribution** – Distribute modifications based on the distribution type of the parent table. Select this distribution type for records that must always be accompanied by other records. For example, items and the bar codes for those items must have the same data distribution.

**Note:** If you select this distribution type, you must set up table links that describe the relationship between the child table and its parent table.

- **By distribution groups** – Distribute modifications based on the distribution list for the record that was changed in the table. For example, changes made to an item are sent only to the stores that sell that item.

**Note:** Typically, you select this distribution type only for tables at the top of the table distribution hierarchy.

- **No distribution** – Do not distribute modifications. If a table of this distribution type is the parent of another table, and the distribution type of the child table is set to **Same as parent distribution**, changes to the child table are not distributed.

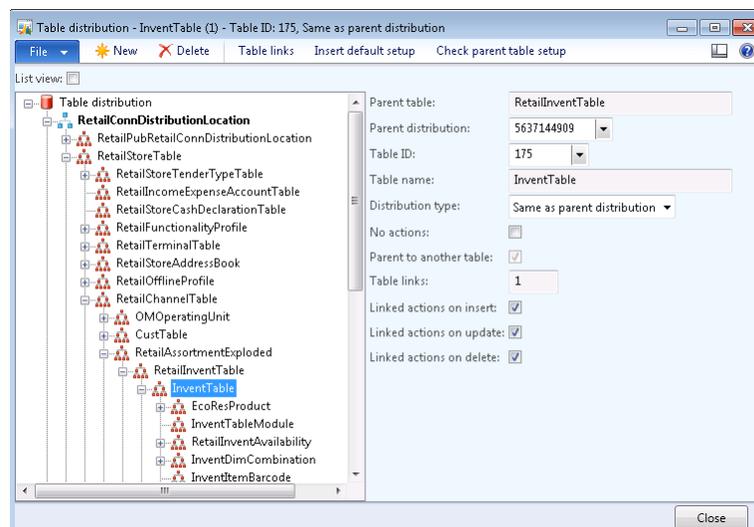
## Parent/child relationships

If you use a table distribution to establish a parent/child relationship between two tables, you must complete both of the following tasks:

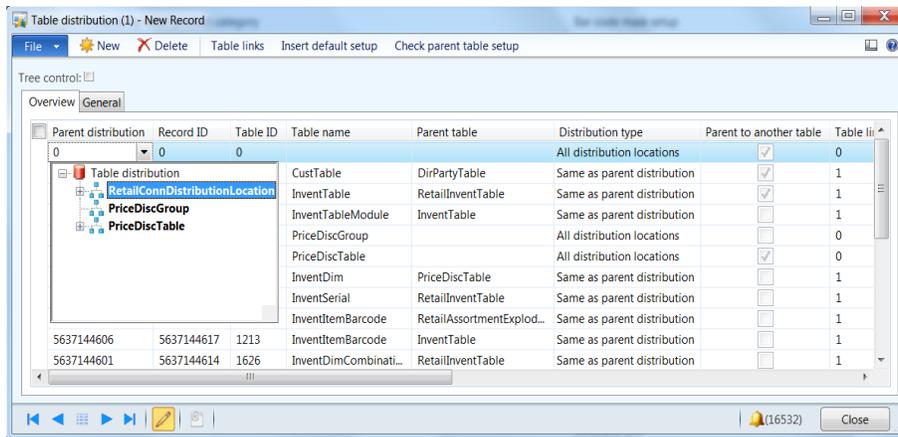
- For the child table, set up table links to describe the relationship between the child table and its parent table. For more information, see the [Set up table links section](#).
- For the parent table, specify the types of actions (insert, update, or delete) that cause any child tables to be distributed together with the parent table. These linked settings also include any linked child tables of the child tables.

## Create a new distribution

1. Click **Retail > Setup > Retail scheduler > Table distribution**. The **Table distribution** form opens.



2. In the **Table distribution** form, click **New**.
3. Select the parent distribution in the list.



The **Record ID** field is automatically populated based on the assigned number sequence.

4. Select the table ID in the window that opens. The **Table name** field displays the name of the selected table.
5. Select the distribution type in the list. The following options are available:
  - **All distribution locations**
  - **Same as parent distribution**
  - **By distribution group**
  - **No distribution**

The **Parent to another table** check box is automatically selected if the table that is selected as parent table is also the parent of other tables.

The **Table links** check box indicates whether a parent/child link has been generated between the two tables. The table link must be created if the distribution type that is selected is the same as the parent distribution.

The **No actions** check box is selected to indicate that no action is required for changes that occur to the selected table. If you want to use no actions, the parent table must be empty or set to **0** (zero).

6. Select the **Linked actions on insert** check box to indicate that the distribution occurs when new records are created in the selected table.
7. Select the **Linked actions on update** check box to indicate that the distribution occurs when existing records are updated in the selected table.
8. Select the **Linked actions on delete** check box to indicate that the distribution occurs when a record is deleted.

9. On the **General** tab, you can review the information entered on the **Overview** tab.

### Insert the default table distribution

The default setup for table distribution is appropriate for most organizations. Even if you want to customize the table distribution, inserting the default setup can save you a lot of time.

**Note:** If you inserted the default setup when you set up the **Retail** module, you can skip this procedure.

1. Click **Retail > Setup > Retail scheduler > Table distribution**.
2. In the **Table distribution** form, click **Insert default setup**.

### How table links work

When a record in a child table is modified, and the resulting pre-action is converted to an action, Retail Scheduler checks whether the modified record is in a table for which distribution is controlled by the settings of a parent table. If the modified table is linked to a parent table for data distribution, Retail Scheduler checks whether the modified record meets the criteria for distribution that are specified in the parent table's settings.

If a table link includes multiple criteria, all the criteria must be met for distribution to occur based on that link. If a modified record does not meet the criteria of any of the links to the parent table, distribution does not occur.

### Set up table links

Table links define the conditions that must be met for the records in a child table to be distributed in accordance with the distribution type of a parent table. The effect of setting up a table link is comparable to the effect of setting up a link between a primary key and a foreign key in SQL Server.

However, a table link applies only to data distribution. Table links are required only for tables for which you select a distribution type of **Same as parent distribution**.

There must be a logical relation between the tables that you link. For example, you cannot link the Item table to the Customer table, because there is no logical relation between those two tables.

For parent fields, you must select fields that are part of the primary key for the parent table.

For child fields, we recommend that you select fields that are either part of the primary key or part of a properly indexed foreign key for the child table.

1. In the **Table distribution** form, select the table to link to its parent table.

**Note:** The parent table must already be listed in the table distribution.

2. Click **Table links**. The **Table links** form opens.

Parent distribution	Link number	Table ID
5637144622	1	77

Parent distribution: 5637144622  
Link number: 1

**General**

Identification	Description
Table ID: 77	Table name: CustTable
Parent table ID: 2303	Table name: DirPartyTable

**Line details**

+ Add - Remove

Parent distribution	Field ID	Field name	Parent field	Field name	Type	Value
5637144622	121	Party	65534	Recl	Field	

Reference field in a different table

3. In the **Table links** form, click **New**.

On the **General** FastTab, the child table information is populated in the **Table ID** and **Parent table ID** fields, and the associated **Description** fields.

4. In the **Parent distribution** field, select a parent table ID.

**Note:** If there are multiple entries in the list, meeting the criteria of any one table link creates the link (SQL OR operation).

5. In the **Field ID** field, select the field to link to a field in the parent table. The field name is displayed automatically.

**Note:** If there are multiple entries in the list, all the criteria must be met for the link to be created.

6. In the **Parent** field, select the field in the parent table to which to link the child field. The parent field name is displayed automatically.

7. Select the type in the list. The value that you select determines the type of check that is required. The following options are available:

- **Field** – The field specifies that the distribution occurs if the logical relation between the fields specified in the parent and child table matches.
- **Filter** – The **Filter** option is not supported in the current version of Microsoft Dynamics AX for Retail.
- **Equals (=)** – Specify the value in the **Value** field to check against the field value during distribution.

8. If the parent field must contain a specific value, type that value in the **Value** field.

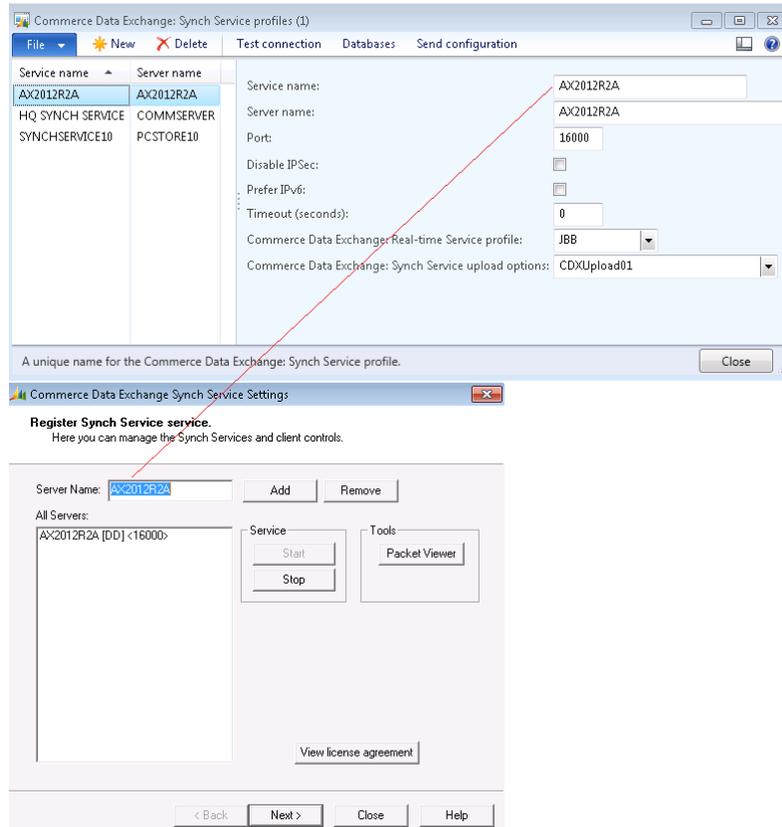
9. Repeat steps 3 through 8 for any additional criteria for this table link.

## Set up communication profiles

### Synch Service profiles

A Synch Service profile in the head office Microsoft Dynamics AX system provides the connection string that enables Microsoft Dynamics AX to communicate with an instance of Synch Service.

1. Click **Retail > Setup > Retail scheduler > Channel integration > Commerce Data Exchange: Synch Service profiles**.



2. Click **New** to create a new Synch Service profile.
3. Enter the following information:
  - **Service name** – The name of the service as it was specified in Synch Service Settings (**Start > All Programs > Microsoft Dynamics AX 2012 > Commerce Data Exchange: Synch Service > Commerce Data Exchange: Synch Service Settings**).
  - **Server name** – The name of the server where Synch Service is installed.
  - **Port** – The port used by this instance of Synch Service.
  - **Disable IPsec** – Select the check box to disable IPsec, a framework of open standards to help protect communications over Internet Protocol (IP) networks through the use of cryptographic security services.

**Important:** IPsec should only be disabled if there are other means in place to help provide secure communication channels for Synch Service.

- **Prefer IPv6** – Select this check box to prefer IPv6 connections, if both IPv4 and IPv6 are available on the network.
- **Timeout (seconds)** – Specify the connection timeout.
- **Real-time Service profile** – The name of a Real-time Service profile.

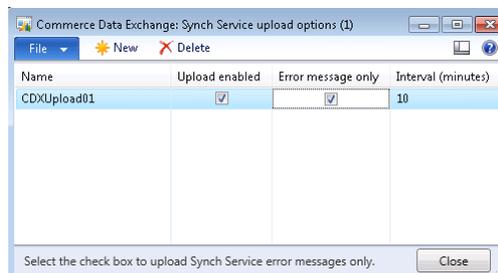
Synch Service uses this profile to connect to Real-time Service to monitor the status of jobs. If you do not want this instance of Synch Service to monitor status, leave this field blank.

- **Commerce Data Exchange: Synch Service upload options** – The name of the upload option used by Synch Service. If you select an upload option, you must click **Send configuration** and restart the service for the settings to take effect.
4. Click **Test connection** to confirm that the connection string for the selected Synch Service profile is correct.

### Create Synch Service upload options

Synch Service uploads status messages from its local message database to Microsoft Dynamics AX by using Real-time Service.

1. Click **Retail > Setup > Retail scheduler > Channel integration > Commerce Data Exchange: Synch Service upload options**.



2. Enter the following information:

**Name** – A unique identifier for the set of upload options.

**Upload enabled** – Select this option to upload status messages to Microsoft Dynamics AX.

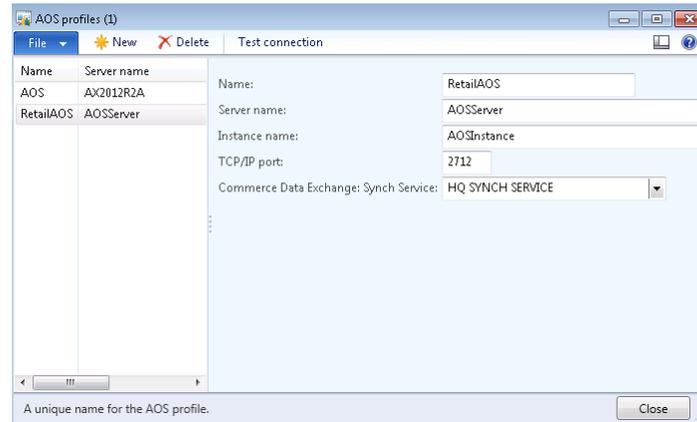
**Error messages only** – Select this option to upload only error messages to Microsoft Dynamics AX. If you do not select this option, all status messages are uploaded

**Interval** – Enter the frequency, in minutes, that status messages are uploaded.

## AOS profiles

An AOS profile provides the connection string that enables Microsoft Dynamics AX to communicate with the head office database.

1. Open the **AOS profiles** form by clicking **Setup > Retail Scheduler > Channel integration > AOS profiles**.

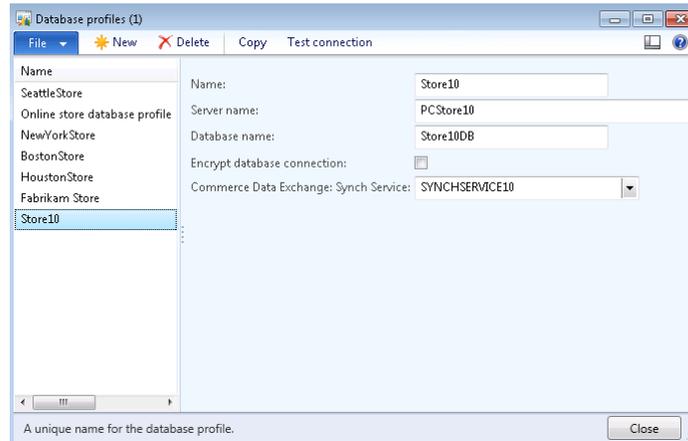


2. Click **New** to create a new AOS profile.
3. Enter the following information:
  - **Name** – Type a unique name for the profile.
  - **Server name** – Type the name of the AOS server.
  - **Instance name** – Type the name of the AOS instance.
  - **TCP/IP port** – Type the TCP/IP port for the AOS instance.
  - **Commerce Data Exchange: Synch Service** – Select the profile for the correct instance of Synch Service.
4. Click **Test connection** to confirm that the connection string for the selected AOS profile is correct.

## Database profiles

A database profile provides the connection string that enables Microsoft Dynamics AX to communicate with a store database.

1. Open the **Database profiles** form by clicking **Setup > Retail Scheduler > Channel integration > Database profiles**.



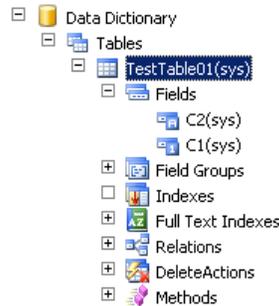
2. Click **New** to create a new database profile. Optionally, you can click **Duplicate** to create a new profile based on a currently selected profile.
3. Enter the following information:
  - **Name** – Type a name for the profile.
  - **Server name** – Type the name of the database server.
  - **Database name** – Type the name of the database.
  - **Encrypt database connection** – Select this check box to encrypt the database connection.
  - **Commerce Data Exchange: Synch Service** – Select the profile for the correct instance of Synch Service.
4. Click **Test connection** to confirm that the connection string for the selected database profile is correct.

## Customize Synch Service

This section contains an example that shows the steps for adding a custom table in Microsoft Dynamics AX and synchronizing the data in that table with a channel database.

### Create the table in Microsoft Dynamics AX

This example uses two fields in a table that is called TestTable01: field **C1** of **integer** type and field **C2** of **string** type.



If you want to use this new table with action scheduler jobs, add the following code snippet to the insert, update, and delete methods, and add it to the filter on action list.

```
boolean replicate = false;

replicate = RetailConnActionManagement::shouldReplicate(this, this.orig(), false);

super();

if (replicate)
{
    RetailConnActionManagement::createActions(this, RetailConnActionUpdate::Insert);
}
```

### Create the table in the POS database

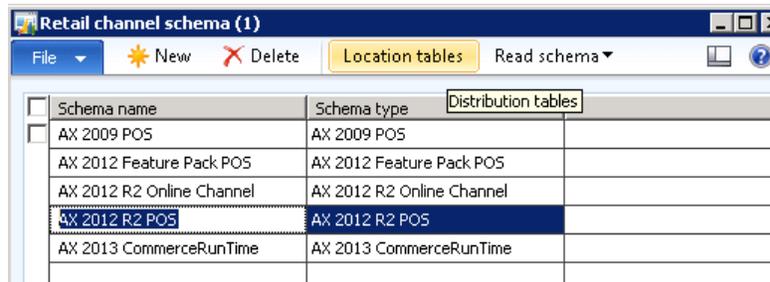
Go to the POS database in SQL Server, and create the new table.

**Note:** In this example, we are implicitly using RecID as the primary key, so RecID must also be included in the POS database table. Because this table is not global, it contains the **DataAreaID** field from Microsoft Dynamics AX. Whether **DataAreaID** is required in the POS database depends on actual business requirements.

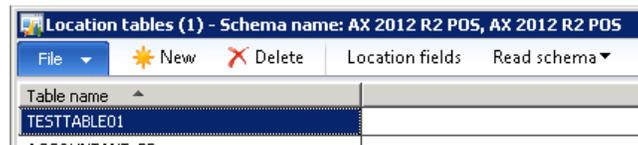
```
CREATE TABLE TESTTABLE01
(
    C1 INT,
    C2 NVARCHAR(10),
    DATAAREAID NVARCHAR(4),
    RECID BIGINT PRIMARY KEY
)
```

## Define the table schema in Microsoft Dynamics AX

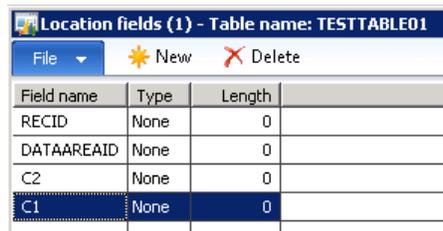
1. Click **Retail > Setup > Retail scheduler > Retail channel schema**.
2. Because this table is for POS, select **AX 2012 R2 POS**, and then click **Location tables**.



3. Create a new table called **TESTTABLE01**.



4. Click **Location fields**, and then add the fields that you defined in the POS database.  
**Note:** The **Type** and **Length** fields have been deprecated and can be ignored. Only the field names matter.

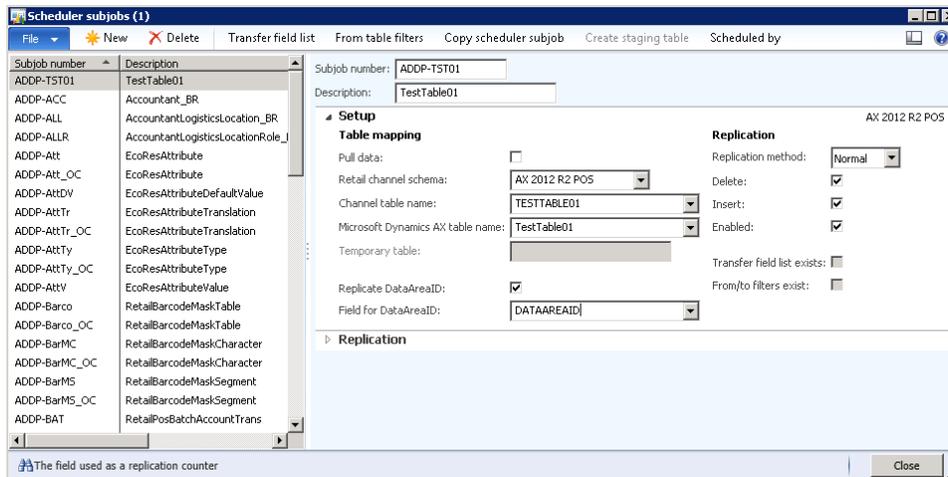


## Define a normal subjob in Microsoft Dynamics AX

Normal subjobs are used in N jobs, which synchronize all data in a table.

1. Click **Retail > Setup > Retail scheduler > Scheduler subjobs**.

2. Create a new subjob like the one shown in the following screenshot.



3. In the **Retail channel schema** field, select **AX 2012 R2 POS**.
4. The **Channel table name** field lists all tables that have been defined for the AX 2012 R2 POS schema. Select **TESTTABLE01**.
5. Because the **DataAreaID** field was included in the new table, you must select the **Replicate DataAreaID** check box. Then, in the **Field for DataAreaID** field, select **DATAAREAID**.

### Define transfer fields

1. Click **Transfer field list**, and then add all field mappings except **DataAreaID**.

From field	Field type	To field	Field type	Conversion type	Conversion value
RecId	Int64	RECID	None	None	
C2	Text	C2	None	None	
C1	Integer	C1	None	None	

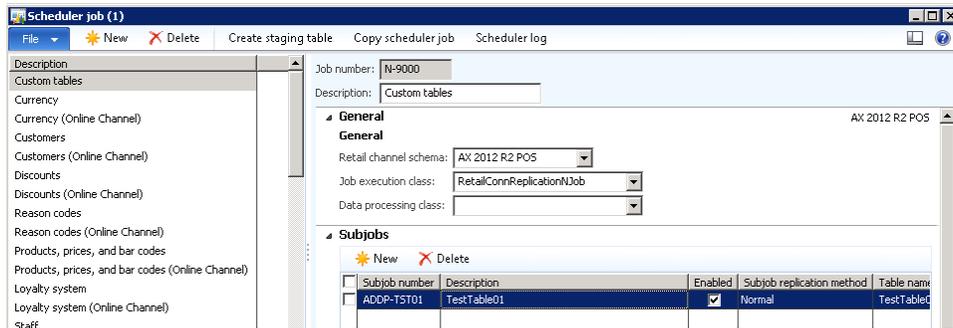
2. Save and close.

### Define a scheduler job

You can add your new subjob to an existing job, or you can create a new job, depending on business requirements.

1. Open the **Scheduler job** form by clicking **Retail > Setup > Retail scheduler > Scheduler job**.

2. Create a new job like the one shown in the following screenshot.

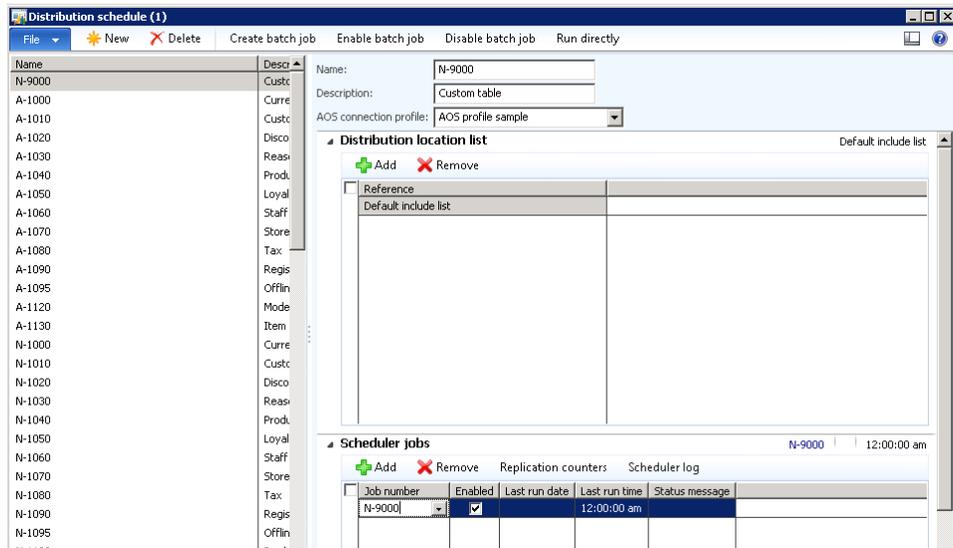


3. Add the newly created subjob to the job.
4. In the **Retail channel schema** field, make sure that **AX 2012 R2 POS** is selected. Because this is a normal subjob, select **RetailConnReplicationNJob** in the **Job execution class** field.

### Define a schedule to run the job

You can add this job to one of the existing Retail schedules, or you can create a new schedule for it, depending on business requirements.

1. Open the **Distribution schedule** form by clicking **Retail > Periodic > Data distribution > Distribution schedule**.
2. Create a new schedule, and include the new job.



You have now completed the setup and configuration to send TestTable01 data to the POS database. You can then enter data into the TestTable01 table and run the scheduler job to verify that data can be sent successfully to the POS database.

## Monitoring Synch Service

Microsoft Dynamics AX for Retail provides several resources for monitoring Synch Service.

### Log files

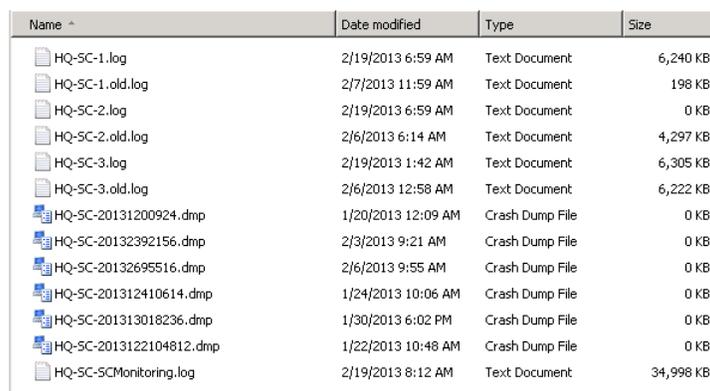
The Synch Service creates two types of log files. By default, log files are stored in the following folder: C:\Users\<service user account>\AppData\Local\Microsoft Dynamics AX\60\Commerce Data Exchange\Synch Service\<service name>\logs

The first log file contains information about regular processing tasks of the Synch Service and is named <InstanceName>-SC-[X].log, where X is an integer between 1 and 3. When you restart an instance of Synch Service, the log file is renamed <InstanceName>-SC-[X].old.log.

Logging and the output location (file or Windows Event log) are configured in Synch Service settings.

The second log file contains error messages for the Synch Service message upload and is named <InstanceName>-SCMonitoring.log.

The following screenshot is an example of how these files look. Files with the .dmp extension are memory dump files.



Name	Date modified	Type	Size
HQ-5C-1.log	2/19/2013 6:59 AM	Text Document	6,240 KB
HQ-5C-1.old.log	2/7/2013 11:59 AM	Text Document	198 KB
HQ-5C-2.log	2/19/2013 6:59 AM	Text Document	0 KB
HQ-5C-2.old.log	2/6/2013 6:14 AM	Text Document	4,297 KB
HQ-5C-3.log	2/19/2013 1:42 AM	Text Document	6,305 KB
HQ-5C-3.old.log	2/6/2013 12:58 AM	Text Document	6,222 KB
HQ-5C-20131200924.dmp	1/20/2013 12:09 AM	Crash Dump File	0 KB
HQ-5C-20132392156.dmp	2/3/2013 9:21 AM	Crash Dump File	0 KB
HQ-5C-20132695516.dmp	2/6/2013 9:55 AM	Crash Dump File	0 KB
HQ-5C-201312410614.dmp	1/24/2013 10:06 AM	Crash Dump File	0 KB
HQ-5C-201313018236.dmp	1/30/2013 6:02 PM	Crash Dump File	0 KB
HQ-5C-2013122104812.dmp	1/22/2013 10:48 AM	Crash Dump File	0 KB
HQ-5C-SCMonitoring.log	2/19/2013 8:12 AM	Text Document	34,998 KB

### Synch Service message database

Each instance of Synch Service uses a message database to track the status of data transfers. The following tables are included in the message database:

- SCMonitoringConfig

This table stores upload configuration information sent from Microsoft Dynamics AX. You can check this table to make sure that the upload configuration was sent for this instance of Synch Service. This table is designed to have only one row.

- IncomingMessages

Field	Description
PackageNo	A sequential package number.
ServiceName	The name of this instance of Synch Service.
MessageID	The description of the scheduler job.
SourceServiceName	The source of the incoming messages.
ReceivedFile	The location for incoming data package files.
ProcessedFile	The location for outgoing data package files.

Field	Description
CancelledByUser	If a scheduler job encounters an error during processing, set this flag to <b>1</b> to skip the remaining retries.
ConnectionString	Connection string for the source.
Status	To find out the meaning of a status, open the AOT in Microsoft Dynamics AX, and locate the RetailConnSCMonIncomingMessages or RetailConnSCMonOutgoingMessages table. Right-click the <b>Status</b> field, and then click <b>Add-Ins &gt; Open new window &gt; Open used enum</b> . <ul style="list-style-type: none"> <li>• Received = 0</li> <li>• Processed = 1</li> <li>• Error = 2</li> <li>• Waiting = 4</li> <li>• No data = 5</li> <li>• Pending forward = 7</li> <li>• To forward = 8</li> <li>• Forwarded = 9</li> </ul>

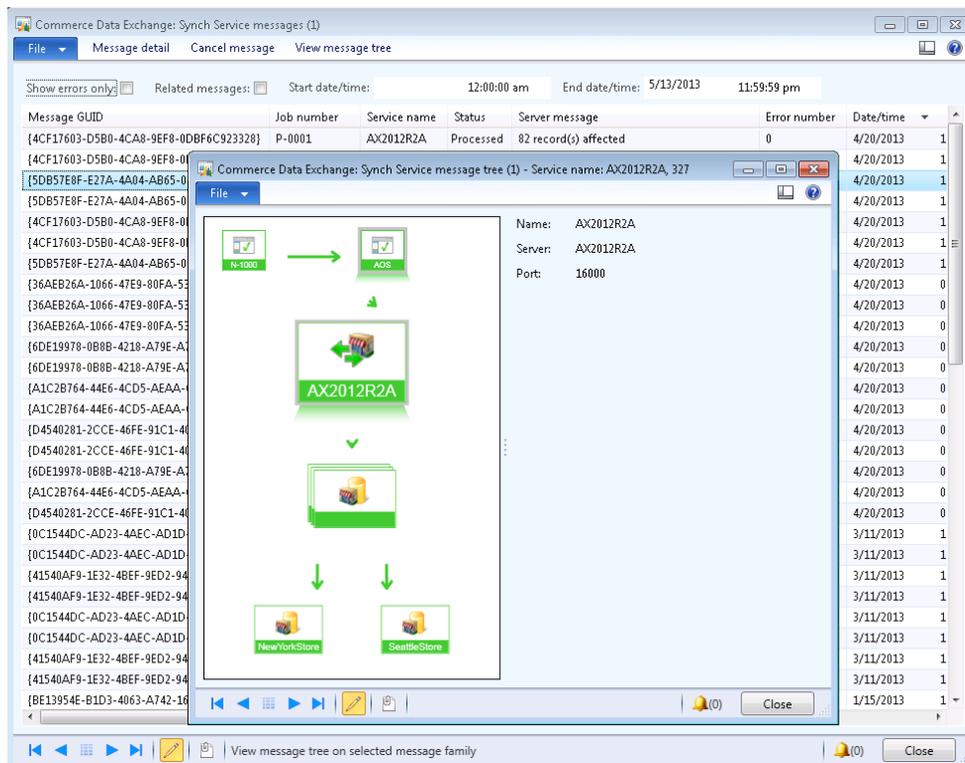
- **OutgoingMessages**

Field	Description
PackageNo	A sequential package number.
ServiceName	The name of this instance of Synch Service.
DestServiceName	The name of the destination instance of Synch Service.
DestServerName	The name of the server where the destination instance of Synch Service is running.
ConnectionString	The connection string for the destination.
Forwarder	The name of the instance of Synch Service that will forward the data package. By default, the forwarder name is the same as the service name.
Status	To find out the meaning of a status, open the AOT in Microsoft Dynamics AX, and locate the RetailConnSCMonIncomingMessages or RetailConnSCMonOutgoingMessages table. Right-click the <b>Status</b> field, and then click <b>Add-Ins &gt; Open new window &gt; Open used enum</b> . <ul style="list-style-type: none"> <li>• Received = 0</li> <li>• Processed = 1</li> <li>• Error = 2</li> <li>• Waiting = 4</li> <li>• No data = 5</li> <li>• Pending forward = 7</li> <li>• To forward = 8</li> <li>• Forwarded = 9</li> </ul>
TryCount	The number of times the system has attempted to process the message.
RemotePkg	The package number assigned by the destination instance of Synch Service.
ErrorNo	The error number, if an error occurred.
CancelledByUser	If a scheduler job encounters an error during processing, set this flag to <b>1</b> to skip the remaining retries.

## Synch Service messages form in Microsoft Dynamics AX

Synch Service status and error messages can be viewed in the **Commerce Data Exchange: Synch Service messages** form. (Click **Retail > Inquiries > Commerce Data Exchange: Synch Service messages**.)

**Note:** You must configure an upload profile before the messages are available in Microsoft Dynamics AX.



## Troubleshooting with error codes

This section provides troubleshooting help for potential Synch Service communication issues. Additional troubleshooting instructions can be found in the following documents:

- For information about troubleshooting location connections, see [Troubleshoot a connection](#).
- For information about troubleshooting jobs in Retail Scheduler, see [Configure and schedule retail data distribution](#).

### Error codes

When a communication issue occurs, an error is returned by Synch Service. You can view Synch Service errors in the following three places in Microsoft Dynamics AX:

- When you are testing the connection for a distribution location, in the Infolog
- In the **Scheduler job** form (Click **Retail > Setup > Retail scheduler > Scheduler job**.)
- In the message database for each instance of Synch Service

The following table lists the errors that are returned by Synch Service, together with the likely cause of the error and suggestions for resolving it.

Error code	Description	Suggested resolution
0	Error on sending request The distribution server for the location has not been specified in Retail Scheduler.	Modify the location by specifying the distribution server for the location ( <b>Retail scheduler &gt; Common forms &gt; Locations</b> ).
4096	Error inserting in system tables Synch Service cannot write to the incoming or outgoing message tables. The tables might be missing, the user that the service is running as might not have read/write permissions to the message database, or required fields in the tables might be wrong or missing.	Grant db_datareader and db_datawriter permissions for the message database to the SQL logon for the user that the Synch Service service runs as.
4097	Remote connection dropped The TCP/IP connection was terminated while Synch Service was forwarding a package, or the receiving Synch Service instance was shut down during the transfer.	Restore the network connection. If the network connection is slow or overloaded, consider increasing the TCP/IP time-out for both Synch Service instances. This is done in Synch Service Settings.
4098	Canceled because of send and receive size The registered size of the package does not match the actual size of the package. This is most likely caused by a transmission failure.	Resend the package by running the Retail Scheduler job again.
4099	Cannot find new packet number Synch Service could not assign a new package number to an incoming package. This is usually caused by an incorrect message database configuration in Synch Service Settings for the receiving instance of Synch Service.	Confirm that the message database is configured correctly, and that the Synch Service user has the required privileges.
4100	Cannot instance a socket The operating system could not create a Windows TCP/IP socket. TCP/IP might not be installed or enabled on the computer.	Confirm that the TCP/IP protocol is installed and enabled on the computer. For more information about enabling TCP/IP, see "Enable remote connections in SQL Server and start the server" in "Deploy Microsoft SQL Server" in the <i>Deployment and Installation Guide</i> .
4102	HopCount has exceeded its maximum value A package cannot be transferred, because the hop counter for the package has reached the maximum that was set in Synch Service Settings. This error can occur when a service name is incorrectly assigned to an IP address. It can also be caused by an inconsistency between the distribution server name for a location and the actual server name for the instance of Synch Service.	Verify the DNS registration of the server name or its entry in the Hosts files on all computers involved. Confirm that the distribution server name for the location ( <b>Retail scheduler &gt; Setup &gt; Channel integration &gt; Commerce Data Exchange: Synch Service profiles</b> ) matches the one in Synch Service Settings.

Error code	Description	Suggested resolution
8192	<p>Error in processing request</p> <p>An unhandled exception occurred while Synch Service was reading from or writing to a database. This error is typically not related to the database connection.</p>	<p>Check the event log for more information. Because this error happened at the database level, it is likely that the database has reported the cause of the error in the event log.</p> <p>Check for an invalid or incorrect field transfer setup in a subjob.</p>
12288	<p>An error occurred connecting to Synch Service</p> <p>The Data Client component of Microsoft Dynamics AX cannot connect to Synch Service. This error occurs when the Synch Service service is not running, when the Data Client is trying to connect to a service that does not exist or does not have a correct IP address associated with it, or when the Data Client is trying to connect to Synch Service on an invalid TCP/IP port.</p>	<p>Start the Synch Service service.</p> <p>Confirm that the Synch Service service name has an IP address associated with it. This can be checked from a command prompt by typing <b>ping &lt;Synch Service computer name&gt;</b>. If the service name does not respond to a <b>ping</b> command, you must reconfigure your DNS server or Hosts file so that the service name is associated with the correct IP address.</p> <p>Verify that the port numbers match in Synch Service Settings and in the Synch Service profile.</p> <p>Verify that IPsec (if enabled) or the firewall is configured correctly. One way to verify this is to connect to the Synch Service port by using Telnet.</p>
12289	<p>The connection string was empty</p> <p>The connection string for the location has not been provided.</p>	<p>In Retail Scheduler, verify that the database profile is configured correctly.</p>
12290	<p>Could not log in</p> <p>Synch Service does not have the necessary permissions to log on to the specified company.</p>	<p>Grant access to the Microsoft Dynamics AX user that is used by Synch Service at the head office.</p> <p>Grant db_reader and db_writer permissions for the POS database to the user that is used by Synch Service at the store.</p>
12291	<p>Connection temporarily unavailable</p> <p>All sessions (servers) that Synch Service is allowed to use are unavailable.</p>	<p>Wait until Synch Service has released one of the sessions that it is using, or assign more sessions to Synch Service in Synch Service Settings.</p>
12293	<p>Cannot load plugin dll</p> <p>In most cases when this error occurs, the plug-in has been registered, and the configuration is correct, but the path to the plug-in .dll file is invalid, or the .dll file is missing.</p>	<p>Uninstall and reinstall the plug-in to correct the registry setting.</p> <p>Remove the Synch Service server, and then add it again.</p>
12294	<p>Plugin version not supported</p> <p>This version of the plug-in cannot be used with this version of Synch Service. In most cases, the plug-in requires a newer version of Synch Service.</p>	<p>Upgrade Synch Service to the same version as the plug-in.</p> <p>Install the version of the plug-in that matches the version of Synch Service.</p>
12295	<p>Waiting for a previous package</p> <p>A previous package belonging to the same JobID has not been processed successfully. Check the job status to determine whether the job is waiting, or whether there is an issue with the job.</p>	<p>Take corrective action so that the package is processed successfully.</p> <p>Cancel the job.</p>

Error code	Description	Suggested resolution
12296	Error connecting to a database Synch Service cannot connect to the database.	If the error occurs when Synch Service is trying to generate a package, the connection string for the source database is probably incorrect. Correct the database or AOS profile configuration, and then test the connection. If possible, test the connection on the same computer that is running Synch Service to confirm that all hosts and services are configured correctly.
12305	Error while sending package information	Retry the operation. Check all connections.
12306	Error while transferring package A connection has failed, or the network is unstable.	Retry the operation. Check all connections.
16384	Error writing file	Free some space on the disk. Confirm that the process has the necessary permissions to write to the disk.
16385	Error creating file Synch Service cannot write to the hard disk. The disk might be full, Synch Service might not have permissions to write to the working directory, or the path to the working directory (as specified in Synch Service Settings) might be incorrect.	Free some space on the disk. Confirm that the process has the necessary permissions to write to the disk. Confirm that the path to the working directory is correct.
16386	Error reading file Synch Service was trying to read a file that does not exist.	Re-create the file by running the job again.

## Troubleshoot common issues with data packages

### A failed package blocks other packages from being processed.

When a package is not processed successfully, its blocked status can keep other packages from being sent, even after you have resolved the cause of the error. To resume normal communications, remove the messages related to the blocked package from the message database. On the originating computer, in SQL Server Management Studio, expand the **Databases** folder, click the message database, and then click **New Query**. In the query pane, type **delete from dbo.IncomingMessages where PackageNo='nnnn'** (where nnnn is the ID number of the failed package), and then click **Execute**. Any associated messages in the OutgoingMessages table are also deleted.

If Synch Service was configured to upload status messages to Microsoft Dynamics AX, the error messages can be viewed in the **Commerce Data Exchange: Synch Service messages** form, which is located at **Retail > Inquiries > Commerce Data Exchange: Synch Service messages**.

**Note:** You can cancel messages with errors to unblock other data packages.

### Synch Service at the head office is unable to read results for a query packet.

If a job does not succeed, and no records are affected in the Retail store or POS database, follow these steps to determine the reason for the failure.

1. Confirm that the request from Retail Scheduler reached the head office instance of Synch Service.
2. Confirm that the request packet, also referred to as an I file (<Synch Service service name>-<sequential number>-I.tmp), was created by Synch Service. If the **Keep Package Files** check box was selected in Synch Service Settings, this file is in the working directory.

3. Verify that the entry in the incoming message table for this packet has no errors. If Synch Service is unable to process a request, it does not generate a result packet, also referred to as an R file (<Synch Service service name>-<sequential number>-R.tmp), which causes an error. The reason for this could be that .NET Business Connector is not configured correctly. Run Setup for Microsoft Dynamics AX 2012, and install only .NET Business Connector. When this installation is completed, you are prompted for details about the AOS instance. Enter the required information, and then restart the Synch Service computer.

.NET Business Connector is required on the head office communications server and on each Microsoft Dynamics AX client computer.

### **Synch Service crashes while processing a large number of transactions.**

The default thread time-out for Synch Service is 1,200 milliseconds, but this might not be sufficient when a large number of transactions is being processed. If you are processing more than 200,000 transactions, and Synch Service crashes without synchronizing the data, try increasing the thread time-out to, for example, 3,600 milliseconds.

### **When you run a distribution schedule, an error is displayed: "Connection profile or Synch Service profile are not configured properly: N-1060."**

Select an AOS connection profile in the **AOS connection profile** list before you run a scheduler job.

### **Synch Service cannot connect to the database.**

Make sure that you give enough database access privileges to the user account that is configured to run Synch Service.

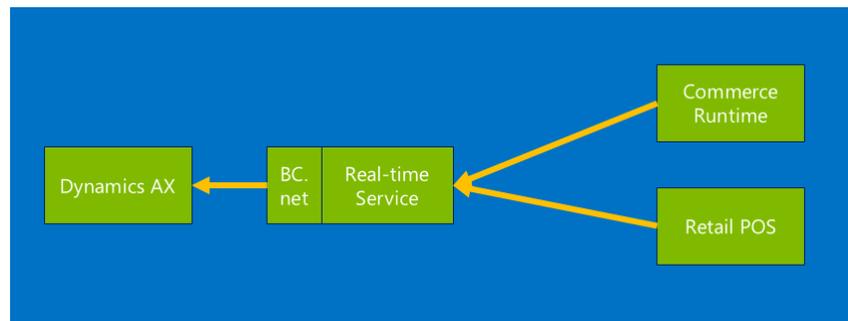
1. Click **Start > Microsoft SQL Server 2008 R2 > SQL Server Management Studio**.
2. Under **Security > Logins**, make sure that the account you use to run Synch Service is listed.

# Commerce Data Exchange: Real-time Service

## Introduction and overview

Real-time Service provides Retail POS and Commerce Runtime with real-time access to Microsoft Dynamics AX data for scenarios such as:

- Customer orders
- Sales orders and invoices
- Customer validation and creation
- Inventory lookup
- Cashier validation
- Credit vouchers
- Gift cards
- Loyalty programs



Retail POS and Commerce Runtime can perform most operations without connectivity to Microsoft Dynamics AX. However, for certain scenarios, both need to retrieve or update data directly in Microsoft Dynamics AX.

## Install and set up Real-time Service

**Note:** The installer only copies necessary files to the computer. You need to follow the instructions to install and configure the service correctly.

### Prerequisites for installing Real-time Service

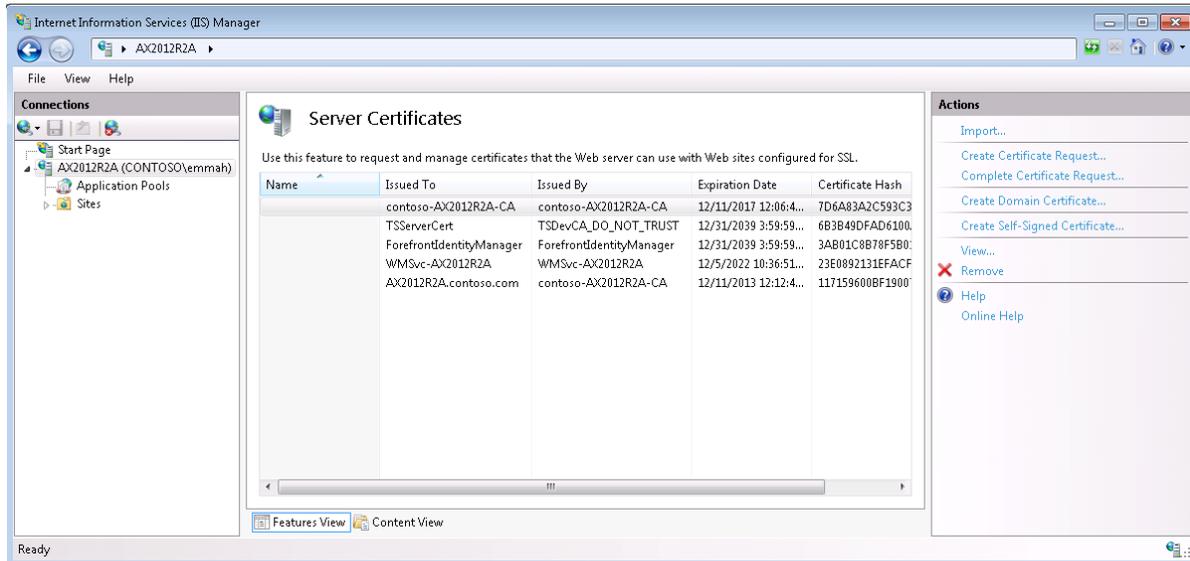
- A Microsoft Windows Server operating system, or a Windows client operating system with Internet Information Services (IIS), IIS Windows PowerShell snap-in, and Windows Process Activation Service, is installed
- You have obtained an SSL certificate with data encryption capability. You can get the certificate from a commercial certification authority (strongly recommended).
- The Real-time Service files are installed.

You should see the binaries installed at %ProgramFiles%\Microsoft Dynamics AX\6.2\Commerce Data Exchange\Real-time Services\6.2.

- .NET Business connector is installed.
- A Microsoft Dynamics AX user account to run as is set up. The user must have the necessary privileges in Microsoft Dynamics AX to perform all the retail tasks.

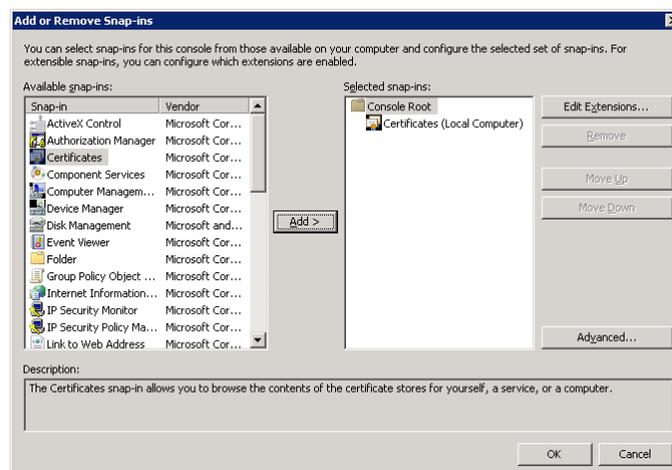
## Server certificate installation

To create and install the SSL certificate, follow the instructions of the certificate authority that provides the certificate. In most cases, you will first create a certificate request in Internet Information Services Manager. The request is sent to the certificate authority, which in turn issues the certificate.

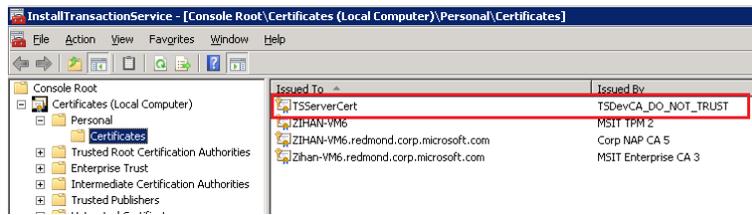


Depending on the certificate authority, you will install the certificate through either using the certificate request in Internet Information Services Manager or import the certificate from a pfx file using the Microsoft Management Console.

1. Open the Microsoft Management Console with administrator privileges. (Click **Start** > **mmc.exe**, right-click, and then click **Run as Administrator**.)
2. Click **File** > **Add/Remove Snap-in**, select **Certificates**, and then select **Local Computer**.



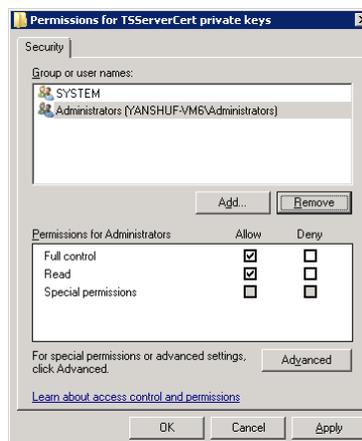
You should see the certificate manager console.



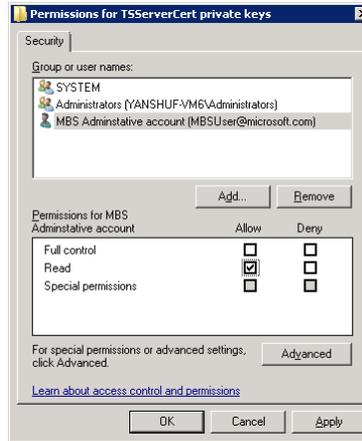
3. In the certificate manager console, right-click **Personal**, and then click **All Tasks > Import**. The Certificate Import Wizard opens.



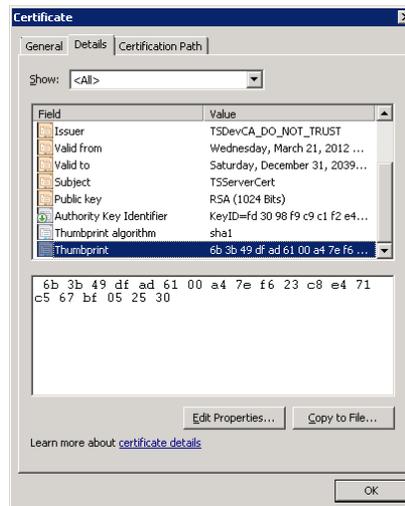
4. Follow the Certificate Import Wizard to finish importing the certificate. Make sure that you import the private key, which is needed for channel encryption.
5. Under **Personal > Certificates**, browse and locate the server certificate. Right-click the certificate, and then click **All Tasks > Manage private keys**. The certificate security dialog box opens.



- In the certificate security dialog box, add the Real-time Service user account to the list, and give read access to the user.



- Under **Personal > Certificates**, browse and locate the server certificate. Double-click the certificate to open the certificate properties dialog box.
- On the **Details** tab, select **Thumbprint**.



The thumbprint is the 20-byte array that is displayed. Copy the value, removing all the spaces. For example, the thumbprint for the certificate in the preceding screenshot is 6b3b49dfad6100a47ef623c8e471c567bf052530.

You need the thumbprint for the service installation.

## Install Real-time Service

1. Open a Windows PowerShell window with administrator privileges, and set the execution policy to remote-signed (or unrestricted if you are using an unsigned script).

```

Administrator: Windows PowerShell
PS C:\> set-executionpolicy remotesigned

Execution Policy Change
The execution policy helps protect you from scripts that you do not trust.
Changing the execution policy might expose you to the security risks described
in the about_Execution_Policies help topic. Do you want to change the execution
policy?
[Y] Yes  [N] No  [S] Suspend  [?] Help (default is "Y"): y
PS C:\>
  
```

2. Change the directory to the sample deployment scripts folder.

This is the Sample Deployment Scripts folder under the Real-time Service binary folder, where you can see a few Windows PowerShell scripts. For the default MSI install, the folder is %ProgramFiles%\Microsoft Dynamics AX\6.2\Commerce Data Exchange\Real-time Services\6.2\Sample Deployment Scripts.

3. Run Windows PowerShell scripts to install Real-time Service.

```
> ./InstallCommerceDataExchangeRealtimeService.ps1.
```

4. When you are prompted by the installation scripts, supply the following mandatory parameters.

Property	Description
User account	The domain\user for the domain account for Real-time Service. <b>Note:</b> This account needs to be a Microsoft Dynamics AX account that has sufficient privileges to perform all the necessary retail tasks.
Password	The password for the domain account.
Service binary source folder path	The service binary folder, where the web.config and service files are located. For the default MSI install, this folder should be something like %ProgramFiles%\Microsoft Dynamics AX\6.2\Commerce Data Exchange\Real-time Services\6.2.
Server certificate thumbprint	The thumbprint for the server certificate.

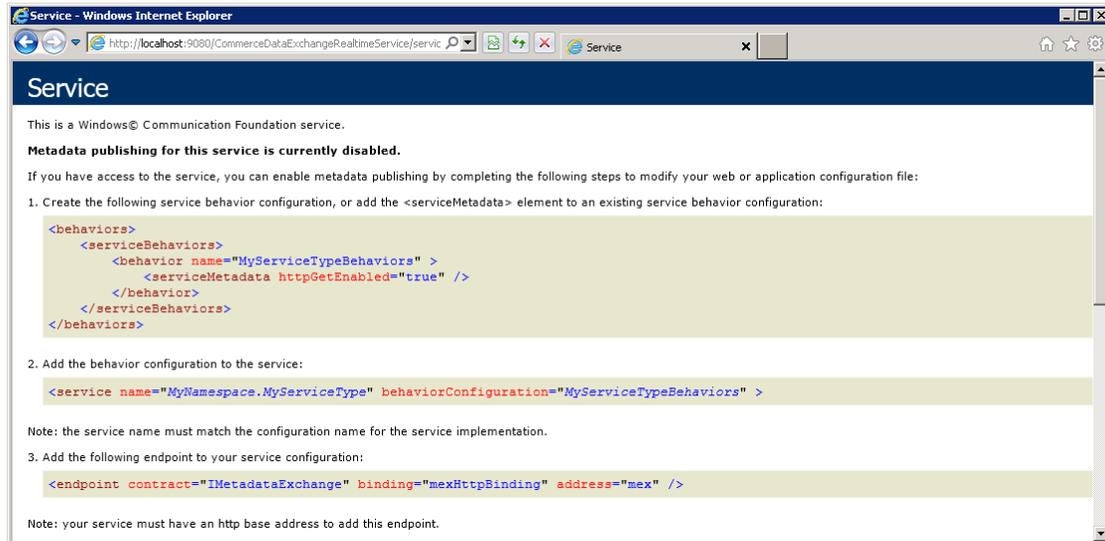
The installation scripts then install Real-time Service with all the required dependency components. If the installation is completed successfully, you see output like the following.

```

Administrator: Windows PowerShell
- Remove existing application ...
  Complete.
- Copy server binaries and config files to the application directory [C:\inetpub\
DynamicsAXRetail\CommerceDataExchangeRealtimeService] ...
  Complete.
- Create applicaiton [CommerceDataExchangeRealtimeService] ...
  Complete.
- Register ASP.NET version with IIS ...
  Complete.
- Configure application to enable net.tcp binding ...
  Complete.
5. Configure Commerce Data Exchange Real-time Service
- Set AOS server connection string [] ...
  Complete.
- Set port sharing service as automatic start ...
  Complete ...

-----
Successfully installed Commerce Data Exchange Real-time Service
-----
PS C:\Program Files (x86)\Microsoft Dynamics AX\6.2\Commerce Data Exchange\Real-
time Services\Sample Deployment Scripts>
  
```

5. In a browser, test the service installation by opening the link to the service: <http://localhost:9080/CommerceDataExchangeRealtimeService/service.svc>. The Windows Communication Foundation (WCF) metadata exchange Help page opens if the service has been configured correctly.

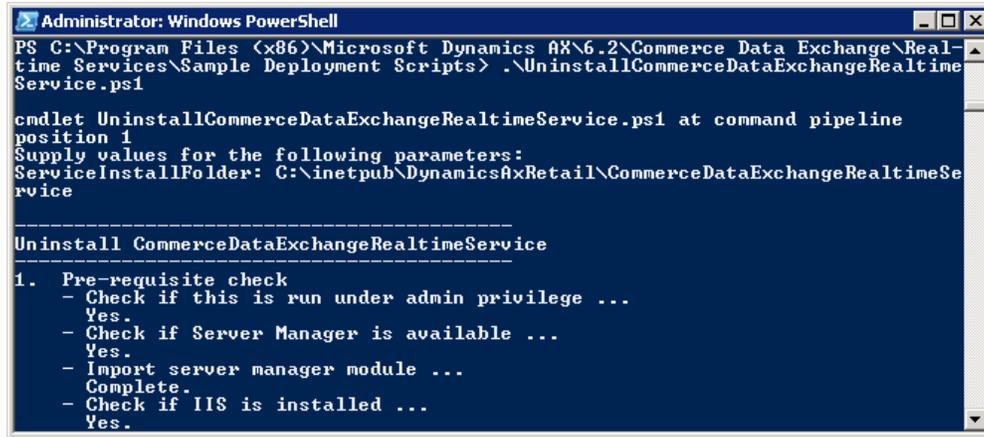


## Uninstall Real-time Service

In the event that you need to uninstall Real-time Service, follow these steps.

1. Open a Windows PowerShell window with administrator privileges, and set the execution policy to remote-signed (or unrestricted if you are using an unsigned script).
2. Change the directory to the sample deployment scripts folder.  
This is the Sample Deployment Scripts folder under the Real-time Service binary folder, where you can see a few Windows PowerShell scripts. For the default MSI install, the folder is `%ProgramFiles%\Microsoft Dynamics AX\6.2\Commerce Data Exchange\Real-time Services\6.2\Sample Deployment Scripts`.
3. Run Windows PowerShell scripts to uninstall Real-time Service.  
`> ./UninstallCommerceDataExchangeRealtimeService.ps1.`

When the script prompts you for the service install folder, provide the path of the folder where the web.config file is located. The default location is %SystemDrive%\inetpub\DynamicsAxRetail\CommerceDataExchangeRealtimeService.

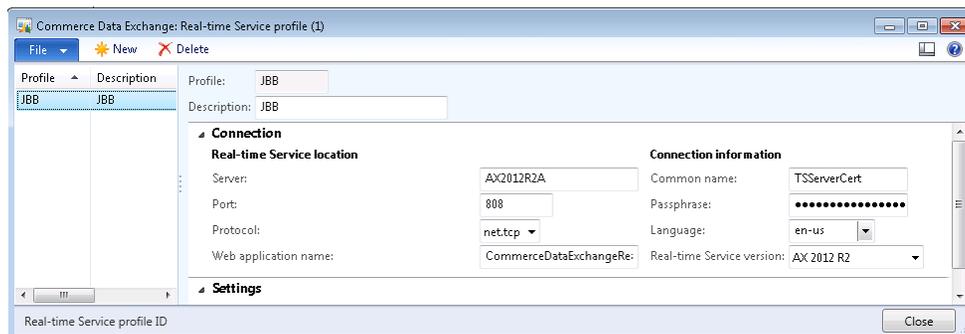


## Configure Real Time Service

### Configure a Real-time Service profile in Microsoft Dynamics AX

The Real-time Service profile contains all the information that the clients need to connect to the server. The service profile can be configured in Microsoft Dynamics AX.

The user interface to configure the Real-time Service is located at **Retail > Setup > Retail scheduler > Channel integration > Real-time Service profiles.**



The following table describes the fields that are available.

Field	Description
Server	The server host name
Port	The port to use for communication. For net.tcp, the default port is 808. For http, the default port is 9081.
Protocol	The communication protocol. By default, it is net.tcp, but we also support https. <b>Note:</b> To use https, you need to change the server configuration. For details, see the <a href="#">Configure Real-Time Service settings section</a> .

Field	Description
Web application name	The web application name for Real-time Service. If you are using the default install script to install the service, the web application name should be CommerceDataExchangeRealTimeService.
Common name	The server certificate common name. You can find this at <b>Start &gt; mmc.exe &gt; Personal &gt; Certificates</b> , in the Issued To column.
Passphrase	The passphrase that is used for Microsoft Dynamics AX to verify that a POS terminal is a valid terminal.
Language	The language used to return error message from Real-time Service.
Real-time Service version	The Real-time Service version to use. Use the default (Microsoft Dynamics AX 2012 R2) unless you are working with N-1 support.

## Configure Real-time Service settings

The Real-time Service server settings can be modified by changing the web.config file. This is a standard WCF configuration file. You can find the file at %SYSTEMDRIVE%\inetpub\DynamicsAxRetail\CommerceDataExchangeRealtimeService\Web.config.

### Change the logging level

The logging level is controlled by using the <system.diagnostics> element. The default logging level is set to **Warning** for the trace log and **Error** for the event log. However, you can change these to **Information** if you need more extensive logging. By default, the trace log is located at C:\Windows\Temp\RetailLogs\w3wp.exe.xml.

```
<system.diagnostics>
  <sources>
    <!-- this registers the listener with traces from a specific source -->
    <source name="RetailNetTracer" switchValue="Warning">
      <listeners>
        <add name="RollingXmlWriterTraceListener" />
      </listeners>
    </source>
    <source name="RetailNetTracerEventLog" switchValue="Error">
      <listeners>
        <add name="EventLogTraceListener" />
      </listeners>
    </source>
  </sources>
  ...
</system.diagnostics>
```

There are two listeners in the preceding configuration: the Windows event log and the log file. To read the contents of the log file, you need to use Service Trace Viewer. To start Service Trace Viewer, click **Start**, and then search for Service Trace Viewer. Alternatively, you can start it from C:\Program Files (x86)\Microsoft SDKs\Windows\v7.0A\Bin\NETFX 4.0 Tools\SvcTraceViewer.exe.

The log file for Real-time Service is located at C:\Windows\Temp\RetailLogs, and the file name is typically w3wp.exe\_00.xml.

### Change the binding configuration

The default binding for Real-time Service is netTcpBinding. WSHttp is also supported for https connections. You can change the binding.

```
<services>
  <service behaviorConfiguration="ReleaseBehavior"
name="Microsoft.Dynamics.Retail.TransactionServices.TransactionService">
```

```

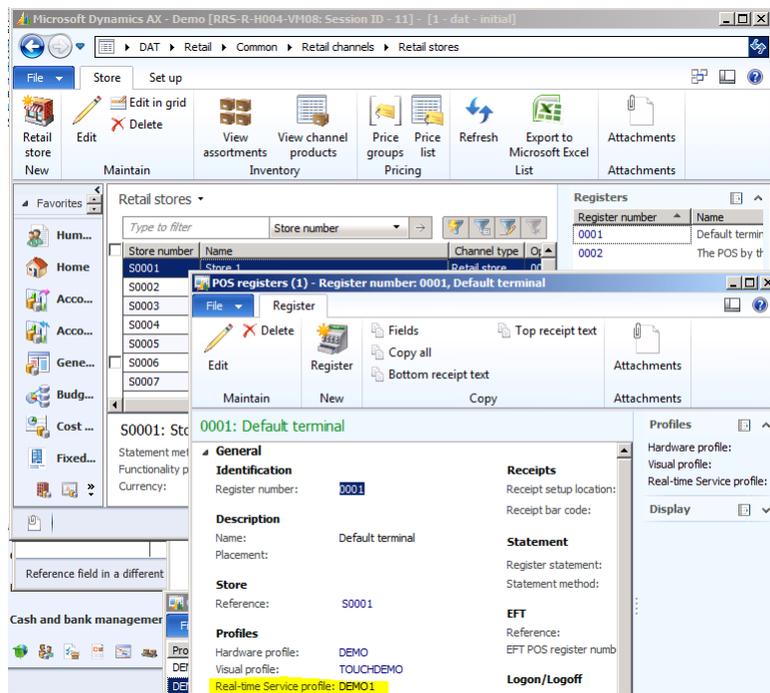
    <endpoint address="Common" binding="netTcpBinding"
bindingConfiguration="StreamedTCPBinding" name="Common"
contract="Microsoft.Dynamics.Retail.TransactionServices.Contracts.ITransactionService" />
    ...
  </service>
</services>

```

**Note:** If you need to change the binding configuration from Net.Tcp to WSHttp, use the binding configuration provided in the config file, and update the Real-time Service profile in Microsoft Dynamics AX. This ensures that the client and server can work together.

## Configure Real-time Service for POS

After you have created a Real-time Service profile, go to the POS register, and configure the Real-time Service profile to be used for that register.



After you have selected a Real-time Service profile, run the Synch Service job A-1090 Registers.

## Real-time Service customization guide

In addition to the default functionality that is delivered with the product, Real-time Service also lets customers and partners extend its functionality by adding extension methods. These methods can be invoked from the client side to perform any custom business logic.

**Note:** For the extension methods to work, Real-time Service must be installed and configured correctly. For more information, see the [Install and set up Real-time Service](#) section.

This section describes how to add extension methods in Microsoft Dynamics AX, and how to consume the extension methods from a Commerce Runtime client.

### Add extension methods in Microsoft Dynamics AX

#### Prerequisites

- An installation of Microsoft Dynamics AX 2012 R2
- A Developer license for Microsoft Dynamics AX 2012 R2

Adding extension methods in Microsoft Dynamics AX is straightforward. You just need to add a new method in the **RetailTransactionServiceEx** class in the AOT. There are a few requirements for this method so that it can be invoked through Real-time Service:

- The method must be a public static method.
- The return type must be a container of length 2 or longer. The first two elements are reserved for a Boolean that indicates success or failure of the method call, and a string that can be used for comment or error message. The other items in the returned container can be of any type, including nested containers.
- The parameters for the method must be of primitive types in Microsoft Dynamics AX. Only the following types are supported because of limitations in .NET Business Connector.

X++ type	CLR type
boolean	System.Boolean
date	System.DateTime
int	System.Int32
int64	System.Int64
str	System.String
guid	System.Guid
Real	System.Single or System.Double

### Example customization of Real-time Service

For this example, we want to add a method that accepts a customer account number and then returns a greeting message that uses the customer's name. For example, for customer Sandy, whose account number is 1001, the method would return "Hello Sandy!"

The implementation in Microsoft Dynamics AX involves adding the following method in the **RetailTransactionServiceEx** class:

```
public static container Hello(AccountNum accountNumber)
{
    CustTable custTable;
    DirPartyTable dirPartyTable;
    container result = [false, ''];
}
```

```

if (accountNumber)
{
    select firstOnly Name from dirPartyTable
    exists join custTable
    where custTable.accountNum == accountNumber
        && dirPartyTable.RecId == CustTable.Party;

    if (dirPartyTable)
    {
        result = [true, 'Success!', strFmt("Hello %1 !", dirPartyTable.Name)];
    }
    else
    {
        result = [false, 'Customer not found!'];
    }
}
else
{
    result = [false, 'accountNumber is null.'];
}

return result;
}

```

### Calling extension methods from a POS client

Consuming the Real-time Service extension methods from a POS or Commerce Runtime client is also straightforward. It is similar to consuming the ordinary Real-time Service methods. The only difference is that, instead of calling **InvokeMethod**, we need to call **InvokeExtensionMethod**.

The following example calls the **Hello** methods that we used as an example in the previous section:

```

public void HelloCustomer(string accountNumber)
{
    try
    {
        var response =
this.CommerceRuntime.TransactionService.InvokeExtensionMethod("Hello", "2014");
        if (response.Count == 1)
        {
            Console.WriteLine(response[0] as string);
        }
    }
    catch (CommunicationException ex)
    {
        Console.WriteLine("Request failed: {0}", ex.Message);
    }
}

```

**Note:** The response successful and comments have been abstracted away. If the request fails (**false** on the first container results), the service client throws a communication exception. Only the additional response data is returned.

### Debugging Real-time Service

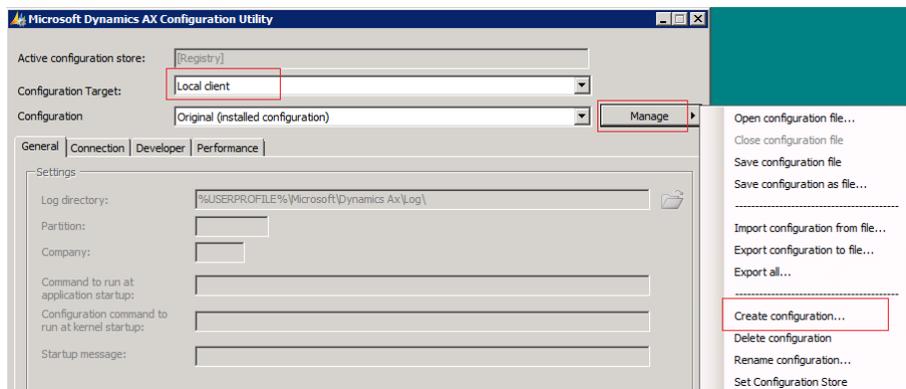
If you use Microsoft Visual Studio to develop your own functionality that calls into Microsoft Dynamics AX through Retail-time Service, you can set up end-to-end debugging by following these steps to

ensure that you can break into your X++ code. Because Real-time Service is built on top of WCF, Microsoft Dynamics AX requires special handling for triggering the X++ debugger when calls come in through WCF.

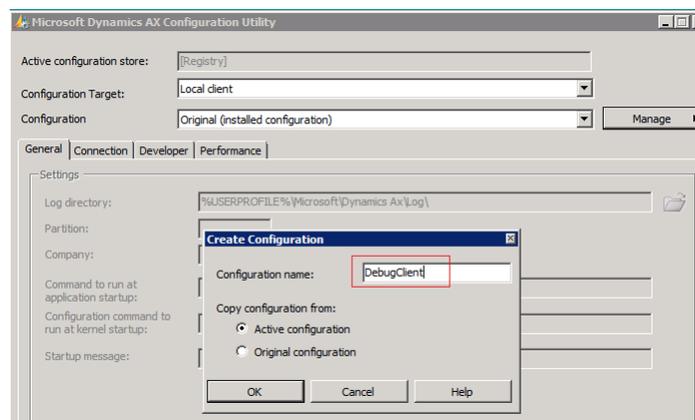
1. Start the Microsoft Dynamics AX 2012 Configuration utility.



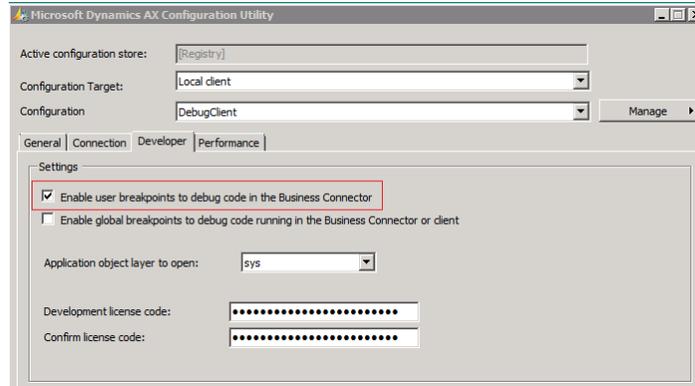
2. Select **Local client**, and then click **Manage > Create configuration**.



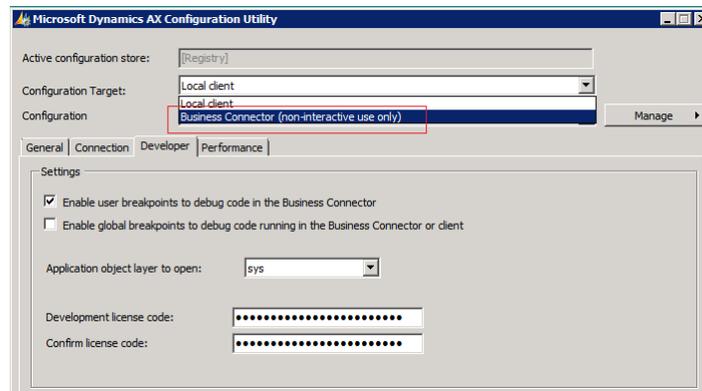
3. Name the client configuration.



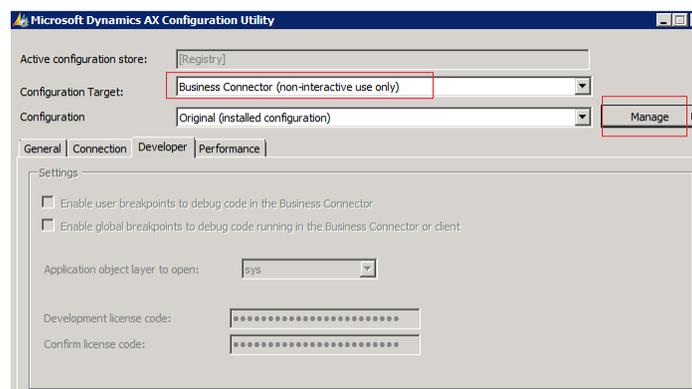
4. Select the **Enable user breakpoints to debug code in the Business Connector** check box. You can leave the license code fields blank.



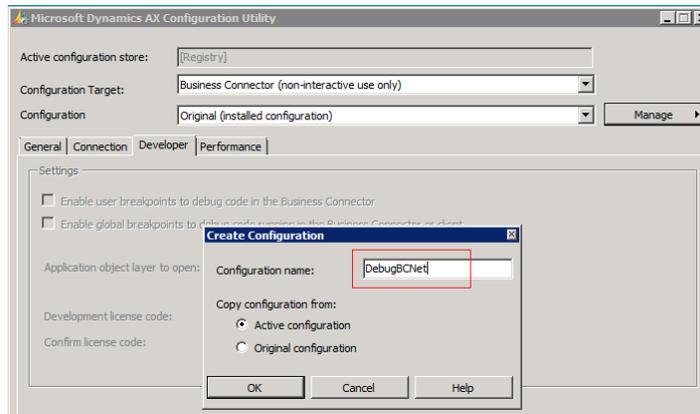
5. Select **Business Connector (non-interactive use only)**.



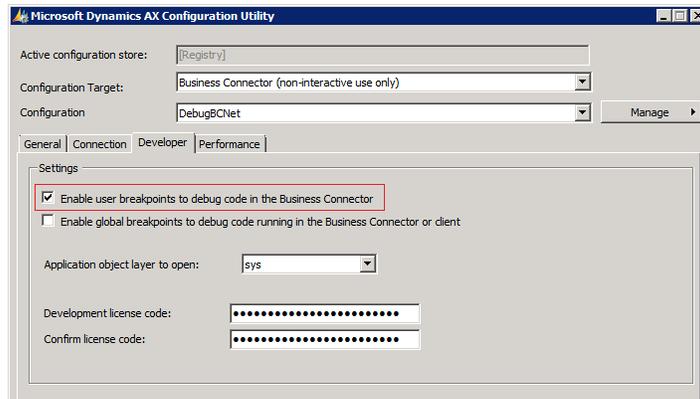
6. Click **Manage > Create configuration**.



7. Name the Business Connector configuration. You will need to find this name in the registry later.

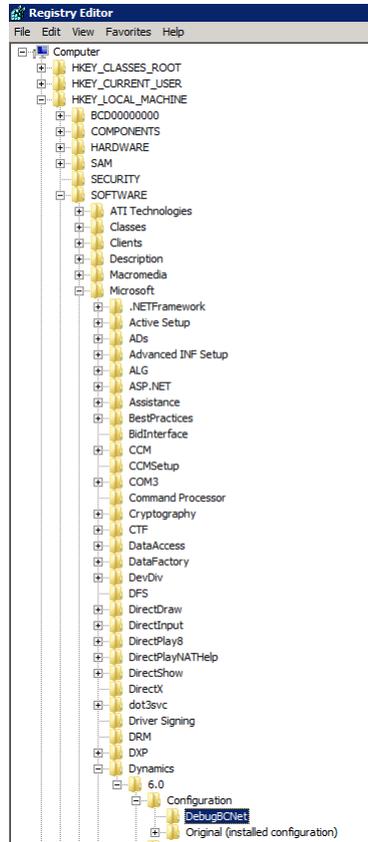


8. Select the **Enable user breakpoints to debug code in the Business Connector** check box. Again, you can leave the license code fields blank.



9. Open Registry Editor by running the command **regedit.exe**.

- Locate the **HKEY\_LOCAL\_MACHINE\SOFTWARE\Microsoft\Dynamics\6.0\Configuration\ConfigName** key, where ConfigName is the name that you gave the Business Connector configuration.



- Create a new string value with the name **debug\_across\_os\_session** and a value of **1**.



- Reset IIS by typing the command **c:>\iisreset**.
- If the X++ method is marked as a server method, you also need to configure AOS server debugging. Set breakpoints in the Microsoft Dynamics AX X++ code, typically in the **RetailTransactionService** class. You should now be able to break into the X++ debugger.

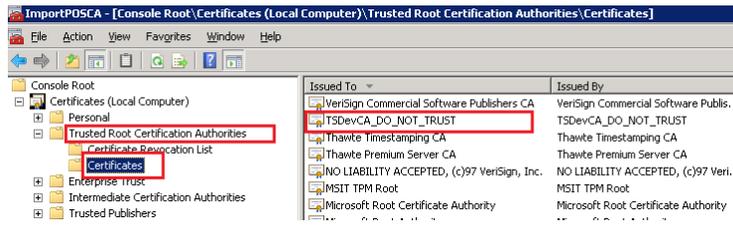
## Troubleshoot Real-time Service

### Issue

You receive a failure message when you try to use a POS terminal to issue gift cards or query customer orders. You drag the POS log (in %temp%\RetailLogs) into Service Trace Viewer (click **Start**, and then search for Service Trace Viewer) to see what happened. The error message says “Communication object cannot be found.”

### Solution

Make sure that you import the certificate into the Personal folder, not the Trusted Root Certification Authorities folder, on the POS computer, as shown in the following screenshot.



## N-1 setup and configuration

The N-1 feature is a set of Microsoft Dynamics AX 2012 R2 functionalities that supports previous versions of POS clients. Database schemas differ between versions of the POS store database. Microsoft Dynamics AX 2012 R2 provides framework support and data transformation, so that Microsoft Dynamics AX 2009 R2 works with the POS database from Microsoft Dynamics AX 2012 Feature Pack.

N-1 also enables customizations and extensions by partners and customers to work with their own set of tables.

To use the N-1 support feature, you need to have the following items:

- A Retail system that has been upgraded to Microsoft Dynamics AX 2012 R2.
- Stores and registers that use POS clients from the previous version (N-1) of Retail.
- The version of Microsoft Dynamics for Retail Store Connect that is used by the previous version of POS.
- Real-time Service 5.1. This is a modified version of Microsoft Dynamics for Retail Transaction Service that enables Microsoft Dynamics AX 2012 R2 to continue to accept calls from stores that use previous versions.
- Microsoft Dynamics AX 2012 R2 Synch Service

The following items are not required:

- The previous version of Retail Transaction Service
- The previous version of Retail Store Connect
- The previous version of Microsoft Dynamics AX

### Example

The example in this section is based on the following assumptions:

- You have a Retail system on Microsoft Dynamics AX 2009 that has one store (S0001) with one terminal (T001).
- The distribution location of the terminal is T001.
- Database profile TestDB5Profile is pointing to the database that is being used by this terminal.
- The Retail Store Connect profile name that is used by this store is TestStoreConnect5Profile, and it is assigned to TestDB5Profile.
- The Retail Transaction Service profile assigned to this terminal is TestTS5Profile.
- The AOS profile name used in the scenario is TestAOSProfile.

### Goal

After the Microsoft Dynamics AX upgrade is completed, you can still use the older version of the software in the store without change, and you can also work with the upgraded Microsoft Dynamics AX 2012 R2 Retail system.

### Set up and configure N-1 support

The following steps are required to set up and configure N-1 support, so that Microsoft Dynamics AX 2012 R2 Retail can work with older version stores.

1. After the upgrade is completed, generate the seed data that is required for N-1 operations. This process creates the scheduler jobs and the logic required to support N-1 operations.
  - a. Open the AOT.

- b. Select the **RetailConnSeedDataGeneratorAX5** class (if the system is upgraded from Microsoft Dynamics AX 2009) or the **RetailConnSeedDataGeneratorAX61** class (if the system is upgraded from Microsoft Dynamics AX 2012 Feature Pack).
- c. Right-click the class, and then click **Open**.

Scheduler jobs that are created by the **RetailConnSeedDataGeneratorAX5** class are suffixed with **\_AX5**. Scheduler jobs that are created by the **RetailConnSeedDataGeneratorAX61** class are suffixed with **\_AX61**.

2. Set the schema type for the distribution location of this terminal to **AX 2009 POS**. This lets the system determine that we are dealing with an N-1 version system.
3. If there is no existing distribution location list, create a new distribution location list, and add distribution location T001 to it. For this example, the new distribution location list is named **DefaultIncludeList**.
4. Open the **Distribution schedule** form, and configure the new scheduler jobs that were created when you ran the class.
  - a. Select each N-1 scheduler job. In this example, these are the jobs suffixed with **\_AX5**.
  - b. Set the AOS profile to the current AOS profile that you are using.
  - c. Set the distribution location list to **DefaultIncludeList**.

5. Create a new Synch Service profile. For this example, the name of the new profile is **StoreConnectv62Profile**.

6. Open the AOS profiles that you are currently using, and set the Synch Service profile to the one that you created in the previous step.

**Note:** The database profile TestDB5Profile that is pointing to the N-1 (older) version store database should still be using the N-1 (older) version Retail Store Connect service. Make sure that the Synch Service profile on the TestDB5Profile database profile is set to **TestStoreConnect5Profile**.

7. In Microsoft Dynamics AX 2012 R2, the Real-time Service profile has a field called **Retail schema type**. By default, after upgrade, the schema type of all Real-time Service profiles is set to the schema type **AX 2012 R2 POS**. For N-1 support, the Real-time Service profile that is used by N-1 (older) version stores and terminals should have the Retail schema type set to **AX 2009 POS**. Therefore, in this example, make sure that the schema type of the Real-time Service profile TestTS5Profile is set to **AX 2009 POS**. Set the server name to the name of the server on which Real-time Service 5.1 is installed.
8. Go to the server on which you installed Real-time Service 5.1, and start the service. By default, it is disabled after setup is completed.

After the preceding steps are completed, you can send and receive data from the N-1 (older) version store by running the scheduler jobs that were created for N-1.

**Note:** In our scenario, the scheduler job is assigned to a distribution list that only contains distribution locations that point to an older version store (locations with schema type **AX 2009 POS**). If the distribution location list that is assigned to the scheduler job contains a mix of distribution locations that have different schema types, the scheduler job only acts on locations with a schema type that matches the schema type of the scheduler job.

Provided that the N-1 feature is being used, the upgrade model and the **SysDeleteObjects** configuration key should not be disabled. Disabling these keys removes all code and data that are used by the N-1 feature.

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