

webMethods EntireX

Administration under Windows

Version 9.6

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EntireX Administration under Windows

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<i>Broker Add-ons</i>	Broker add-ons: Broker stubs, command-line utilities, Attach Manager.
<i>Broker Agents</i>	Broker agents.
<i>RPC Servers, Listeners and Bridges</i>	RPC servers, listeners and bridges.
<i>Authorization Rules</i>	Authorization rules.
<i>Logging and Tracing</i>	Logging, tracing and accounting.

1 Configuring webMethods EntireX to Run with the Microsoft Windows Personal Firewall

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If your machine is already running within a firewall-protected enterprise environment, please contact your system administrator to clarify whether this Windows firewall can be switched off to avoid having to configure it.



Caution: Disabling the firewall is solely your responsibility as user. Under no circumstances shall Software AG be responsible for any loss or other damages or costs which might occur due to disabling the Windows firewall.

For detailed information on configuring the Windows firewall, see the Microsoft documentation provided with your Windows version. In addition to this information, Software AG provides examples of how to run EntireX in an environment protected by the Windows firewall. However, these examples only provide technical guidelines; Software AG cannot guarantee that the examples given will provide the security you require.

These examples are based on two methods: one to allow a specific executable to open ports, the other to allow a specific port to be used by a certain program on your PC. The methods below use the EntireX Broker kernel as an example. For other EntireX components, see the list of executables and port numbers for the relevant information.

Method 1 - Allow a Specific Executable to Open a Port

This method involves adding the broker kernel as an “allowed program”. This means it can open any port for both TCP and UDP communication.

▶ To add the broker kernel as an allowed program

- Enter command:

```
C:\>netsh firewall add allowedprogram  
program="C:\SoftwareAG\EntireX\bin\etbnuc.exe" name="EntireX Broker Kernel"  
profile=ALL
```

▶ To remove the broker kernel as an allowed program

- Enter command:

```
C:\>netsh firewall delete allowedprogram  
program="C:\SoftwareAG\EntireX\bin\etbnuc.exe" profile=ALL
```

This example is for the EntireX Broker kernel program. To add other EntireX components as allowed programs, see [Overview of Executables and Port Numbers](#) below.

Method 2 - Allow a Specific Port to be used on your PC

This method involves opening a specific port for all programs.

▶ To open a specific port

■ Enter command:

```
C:\>netsh firewall add portopening protocol=TCP port=1971 name="EntireX Broker  
Kernel" profile=ALL
```

▶ To close a specific port

■ Enter command:

```
C:\>netsh firewall delete portopening protocol=TCP port=1971 profile=ALL
```

This example is for the EntireX Broker kernel program. To open a port for other EntireX components, see [Overview of Executables and Port Numbers](#) below.

Overview of Executables and Port Numbers

To run all of EntireX and its subprograms you will need to open a variety of communications ports, depending on the functionality you are using. Below is a list of programs that need to establish communications ports. You may choose which of the programs or ports you want to use on the PC.

It is important to note that the file locations and the port numbers listed are the default settings. These parameters may be customized during the installation process. If you did not install using the default settings, you will need to use your custom parameters.

See *Method 1 - Allow a Specific Executable to Open a Port* and *Method 2 - Allow a Specific Port to be used on your PC* for the syntax required.

Component	Method 1			Method 2	Notes
	Program Name	Executable	File Location	Default Port Numbers	
EntireX Broker Kernel	EntireX Broker Kernel	etbnuc.exe	C:\SoftwareAG\EntireX\bin\	TCP port: 1971 SSL port: 1958	
EntireX Broker Administration Service	EntireX Broker Administration Service	etbnuc.exe	C:\SoftwareAG\EntireX\bin\	TCP port: 57707 SSL port: 57708	
EntireX Broker Agent	Broker Agent (com. softwareag. entirex.ba. Broker Agent)	java.exe	%JAVA_HOME%\bin\java.exe (see note *)	TCP port: 3000	When administering Broker Agent with System <i>javaw.exe</i> must be run from Windows Firewall path name of
SSL Broker Agent	SSL Broker Agent (com. softwareag. entirex.ba. SSL Broker Agent)	java.exe	%JAVA_HOME%\bin\java.exe	TCP port: 1958	SMH Broker Agent <i>javaw.exe</i> that is in %CommonProgramFiles%\SoftwareAG\jre<java version>\bin\ the <i>javaw.exe</i>
Software AG Web Server	Software AG Web Server	java.exe	%JAVA_HOME%\bin\java.exe	HTTP: 10010 (Base port)	Method 1 requires <i>java.exe</i> and/or allow all Java open ports. To allow this, use specify just
System Management Hub	Web User Interface Ports		C:\SoftwareAG\EntireX\smh\bin	HTTP port:10010 HTTPS port:10011 TCP/IP port:10013	You can configure numbers during installation of the Hub. Depending on components not be used.
	CS Layer Server	argsrv.exe		HTTP port:10015 HTTPS port:10012 TCP/IP port:10014	

(*) Optional, because this port is used only for outgoing packages.

2 Setting up Broker Instances

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Starting and Stopping the Default Broker

If check box **Turn on Autostart for default EntireX Broker** is checked during installation, the default broker ETB001 is started.

▶ To start the default broker

- From the Windows start menu, choose **Software AG > Start Servers > Start EntireX Default Broker**.

▶ To stop the default broker

- From the Windows start menu, choose **Software AG > Stop Servers > Stop EntireX Default Broker**.

Running Broker with SSL or TLS Transport

Before starting the Broker, it must be configured to correctly use SSL or TLS as a transport mechanism:

- [Step 1: Modify Broker-specific Attributes](#)
- [Step 2: Modify SSL-specific Attributes](#)

Step 1: Modify Broker-specific Attributes

Append "-SSL" to the `TRANSPORT` attribute. For example:

```
DEFAULTS = BROKER  
TRANSPORT = TCP-SSL
```

See also `TRANSPORT`.

Step 2: Modify SSL-specific Attributes

Set the SSL or TLS attributes, for example:

```
DEFAULTS = SSL
KEY-STORE = "C:\SoftwareAG\EntireX\etc\ExxAppCert.pem"
KEY-PASSWD-ENCRYPTED = MyAppKey
KEY-FILE = "C:\SoftwareAG\EntireX\etc\ExxAppKey.pem"
VERIFY-CLIENT = N
PORT=1958
```

where *1958* is the default but can be changed to any port number.

See also *SSL-specific Attributes (DEFAULTS=SSL)* under *Broker Attributes* in the platform-independent administration documentation and *SSL or TLS and Certificates with EntireX*.

Uniqueness Test for Broker ID

To guarantee that a broker ID is unique on one machine, a named semaphore is created at initialization. If this semaphore already exists for this broker ID, initialization is terminated with message ETBE0168, "This instance of broker already running". If as a result of an abnormal broker termination this semaphore cannot be deleted completely, you can force a restart of the Broker with Broker attribute `FORCE=YES`.

Tracing EntireX Broker

This section covers the following topics:

- [Broker TRACE-LEVEL Attribute](#)
- [Attribute File Trace Setting](#)
- [Deferred Tracing](#)

Broker TRACE-LEVEL Attribute

The Broker `TRACE-LEVEL` attribute determines the level of tracing to be performed while Broker is running. The Broker has a master `TRACE-LEVEL` specified in the Broker section of the attribute file as well as several individual `TRACE-LEVEL` settings that are specified in the following sections of the attribute file. You can also modify the different `TRACE-LEVEL` values while Broker is running, without having to restart the Broker kernel for the change to take effect.

For temporary changes to `TRACE-LEVEL` without restarting the Broker, use the System Management Hub.

Individual Settings	Specified in Attribute File Section
Master trace level	DEFAULTS=BROKER
Persistent store trace level	DEFAULTS=ADABAS CTREE DIV (currently not available for DIV)
Conversion trace level	Trace option of the CONVERSION parameter that can be defined in DEFAULTS=SERVICE TOPIC
Security trace level	DEFAULTS=SECURITY

These individual TRACE - LEVEL values determine the level of tracing within each subcomponent. If not specified, the master TRACE - LEVEL is used.

Attribute File Trace Setting

Trace Level	Description
0	No tracing. Default value.
1	Traces incoming requests, outgoing replies, and resource usage.
2	All of Trace Level 1, plus all main routines executed.
3	All of Trace Level 2, plus all routines executed.
4	All of Trace Level 3, plus Broker ACI control block displays.
8	All of Trace Level 4, plus Adabas Persistent Store Adabas control blocks.



Note: Trace levels 2 and above should be used only when requested by Software AG support.

Deferred Tracing

It is not always convenient to run with TRACE - LEVEL defined, especially when higher trace levels are involved. Deferred tracing is triggered when a specific condition occurs, such as an ACI response code or a broker subtaskabend. Such conditions cause the contents of the trace buffer to be written, showing trace information leading up the specified event. If the specified event does not occur, the Broker trace will contain only startup and shutdown information (equivalent to TRACE - LEVEL=0). Operating the trace in this mode requires the following additional attributes in the broker section of the attribute file. Values for TRBUFNUM and TRAP - ERROR are only examples.

Attribute	Value	Description
TRBUFNUM	3	Specifies the deferred trace buffer size = 3 * 64 K.
TRMODE	WRAP	Indicates trace is not written until an event occurs.
TRAP - ERROR	322	Assigns the event ACI response code 00780322 "PSI: UPDATE failed".

Protecting a Broker against Denial-of-Service Attacks

An optional feature of EntireX Broker is available to protect a broker running with `SECURITY=YES` against denial-of-service attacks. An application that is running with invalid user credentials will get a security response code. However, if the process is doing this in a processing loop, the whole system could be affected. If `PARTICIPANT-BLACKLIST` is set to `YES`, EntireX Broker maintains a blacklist to handle such “attacks”. If an application causes ten consecutive security class error codes within 30 seconds, the blacklist handler puts the participant on the blacklist. All subsequent requests from this participant are blocked until the `BLACKLIST-PENALTY-TIME` has elapsed.

Server Shutdown Use Case

Here is a scenario illustrating another use of this feature that is not security-related.

An RPC server is to be shut down immediately, using Broker Command and Information Services (CIS), and has no active request in the broker. The shutdown results in the `LOGOFF` of the server. The next request that the server receives will probably result in message 00020002 "User does not exist", which will cause the server to reinitialize itself. It was not possible to inform the server that shutdown was meant to be performed.

With the *blacklist*, this is now possible. As long as the blacklist is not switched off, when a server is shut down immediately using CIS and when there is no active request in the broker, a marker is set in the blacklist. When the next request is received, this marker results in message 00100050 "Shutdown IMMED required", which means that the server is always informed of the shutdown.

3

Configuring the Administration Service under Windows

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The Administration Service controls the processes of the local brokers. The brokers are started or stopped. The local brokers connect with the Administration Service and provide it with their status and other information at an interval of 60 seconds. The Administration Service always has information on the current status of all local brokers.

The Administration Service also collates the status and other information of any known remote brokers and provides an interface with which these can be accessed.

Requirements

The Administration Service is provided in a fully functional state and is started by the installation. It needs access to the local port 57707, and to port 57708 for remote connections. The connections to port 57708 are SSL only. If this port is to be used, the client requires the respective SSL certificate. If no remote access to the Administration Service is required, you can deactivate this port. To deactivate the port, change the transport from "TCP-SSL" to "TCP". See `TRANSPORT`. The attribute file is in the working directory of the Administration Service, `config/etb/ETBSRV`.

Introduction

It is not normally necessary to change the configuration of the Administration Service. The log file, configuration file and SSL certificates are delivered in the EntireX directory `config/etb/ETBSRV`. If an error occurs, the log file of the Administration Service can provide information on the cause of the error. On Windows, the log file is called `ETBSRV.atr`.

The Administration Service requires SSL certificates to create brokers with SSL ports. During installation, the Administration Service copies the SSL certificates from the EntireX "etc" directory to the EntireX `config/etb` directory if this directory does not already contain any certificates. These certificates are for test purposes only and constitute a security risk. If you want to use SSL, replace the certificates in the `config/etb` directory with your own SSL certificates.

When a broker is created, the Administration Service copies the required certificates from the EntireX "config/etb" directory to the working directory of the newly created broker.

If the certificates are to be replaced after the installation, you also need to replace the certificates in the working directories `ETBSRV` (Administration Service) and `ETB001` (Default Broker) in the EntireX directory `config/etb`.

The Administration Service stores data in a directory service. The name of the corresponding data file is stored in file `xds.ini` in the EntireX directory `config`. You can also store the data of the Administration Service in LDAP. For this you need to adapt the entries in file `xds.ini` accordingly. The section for Administration Service is headed "[CIS Management]".

Saving the Data of Administration Service in a Flat File (Default)

This is the default definition in file *xds.ini*:

```
[CIS Management]
dirservice=FLATDIR
file=C:\SoftwareAG\EntireX\etc\flat
```

Saving the Data of Administration Service in LDAP

Modify default definition in file *xds.ini* to match your environment.

```
[CIS Management]
dirService=LDAPDIR
baseDN=<DN>
host=<host>
port=<port>
protocol=<protocol>
authDN=<user>
authPass=<ldap_password>
```

- where *<DN>* is the base distinguished name of the directory object that is the root of all objects for authorization rules; *<DN>* must not be empty
- <host>* is the host of the LDAP server.
- <port>* is the port of the LDAP server. Default is 389 for TCP communication; default port for SSL is 636
- <protocol>* is either "ldap" (default) for TCP communication, or "ldaps" for SSL

For authenticated access to the LDAP server, use the keywords *authDN* and *authPass*,

- where *<user>* is the DN of the user
- <ldap_password>* is the password of this user



Caution: The password is not encrypted in *xds.ini*

For unauthenticated access to the LDAP server, do not include these keywords *authDN* and *authPass* in the *xds.ini*.

Example

```
dirService=LDAPDIR
host=myHost.myDomain
baseDN=dc=myCompany,dc=de
port=389
protocol=ldap
authDN=cn=admin,dc=myCompany,dc=de
authPass=myLdapPassword
```

Changing the Configuration of a Running Administration Service

If the configuration of a running Administration Service is changed from flat file to LDAP, the Administration Service recognizes this and stores its data in LDAP without any further intervention.

The status of the configuration file *xds.ini* is checked every 60 seconds. This means it can take up to 60 seconds for the changes to the configuration file are activated.

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Note: This section lists all EntireX Broker parameters. Not all parameters are applicable to all supported operating systems.

The Broker attribute file contains a series of parameters (attributes) that control the availability and characteristics of clients and servers, publishers and subscribers as well as of the Broker itself. You can customize the Broker environment by modifying the attribute settings.

Name and Location of Attribute File

The name and location of the broker attribute file is platform-dependent.

Platform	File Name/Location
Windows	File <code><BrokerName>.atr</code> in directory <code><InstDir>\EntireX\config\etb\<BrokerName></code> (default) *

* When starting a broker manually, name and location of the broker attribute file can be overwritten with the environment variable `ETB_ATTR`.

Attribute Syntax

Each entry in the attribute file has the format:

```
ATTRIBUTE-NAME=value
```


The following rules and restrictions apply:

- A line can contain multiple entries separated by commas.
- Attribute names can be entered in mixed upper and lowercase.
- Spaces between attribute names, values and separators are ignored.
- Spaces in the attribute names are not allowed.
- Commas and equal signs are not allowed in value notations.
- Lines starting with an asterisk (*) are treated as comment lines. Within a line, characters following an * or # sign are also treated as comments.
- The `CLASS` keyword must be the first keyword in a service definition.
- Multiple services can be included in a single service definition section. The attribute settings will apply to all services defined in the section.
- Multiple topics can be included in a single topic definition section. The attribute settings will apply to all topics defined in the section.
- Attributes specified after the service definition (`CLASS`, `SERVER`, `SERVICE keywords`) overwrite the default characteristics for the service.
- Attributes specified after the topic definition (`TOPIC keyword`) override the default characteristics for the topic.
- Attribute values can contain variables of the form `${variable name}` or `$variable name`:

- Due to variations in EBCDIC codepages, braces should only be used on ASCII (UNIX or Windows) platforms or EBCDIC platforms using the IBM-1047 (US) codepage.
- The variable name can contain only alphanumeric characters and the underscore (_) character.
- The first non-alphanumeric or underscore character terminates the variable name.
- under UNIX and Windows, the string `${variable name}` is replaced with the value of the corresponding environment variable.
- On z/OS, variable values are read from a file defined by the DD name `ETBVAR`. The syntax of this file is the same as the attribute file.
- If a variable has no value: if the variable name is enclosed in braces, error 00210594 is given, otherwise `$variable name` will be used as the variable value.
- If you encounter problems with braces (and this is quite possible in a z/OS environment), we suggest you omit the braces.

Broker-specific Attributes

The broker-specific attribute section begins with the keyword `DEFAULTS=BROKER`. It contains attributes that apply to the broker. At startup time, the attributes are read and duplicate or missing values are treated as errors. When an error occurs, the broker stops execution until the problem is corrected.

 **Tip:** To avoid resource shortages for your applications, be sure to specify sufficiently large values for the broker attributes that define the global resources.

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/SE	BS2000
ABEND-LOOP-DETECTION	<u>YES</u> NO	O	z	u	w	v	b
<p>YES Stop broker if a task terminates abnormally twice, that is, the same abend reason at the same abend location already occurred. This attribute prevents an infinite abend loop.</p> <p>NO Use only if requested by Software AG Support. This setting may make sense if a known error leads to an abnormal termination, but a hotfix solving the problem has not yet been provided. Reset to "YES" when the hotfix has been installed.</p>							
ABEND-MEMORY-DUMP	<u>YES</u> NO	O	z	u	w	v	b
<p>YES Print all data pools of the broker if a task terminates abnormally. This dump is needed to analyze the abend.</p> <p>NO If the dump has already been sent to Software AG, you can set to "NO" to avoid the extra overhead.</p>							
ACCOUNTING	<u>NO</u> 128-255	O	z				
	<u>NO</u> YES [SEPARATOR= <i>char</i>]	O		u	w	v	b
<p>Determines whether accounting records are created.</p> <p>NO Do not create accounting records.</p> <p><i>nnn</i> The SMF record number to use when writing the accounting records.</p> <p>YES Create accounting data. <i>char</i>=separator character(s). Up to seven separator characters can be specified using the SEPARATOR suboption, for example ACCOUNTING = (YES, SEPARATOR=;). If no separator character is specified, the comma character will be used.</p>							

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	See also <i>Accounting in EntireX Broker</i> in the z/OS administration documentation.						
ACCOUNTING-VERSION	1 2 3 4	O	z	u	w	v	b
	<p>Determines whether accounting records are created.</p> <p>1 Collect accounting information. This value is supported for reasons of compatibility with EntireX Broker 7.2.1 and below.</p> <p>2 Collect extended accounting information in addition to that available with option 1.</p> <p>3 Create accounting records in layout of version 3.</p> <p>4 Create accounting records in layout of version 4.</p> <p>This parameter applies when ACCOUNTING is activated.</p>						
AUTOLOGON	YES NO	O	z	u	w	v	b
	<p>YES LOGON occurs automatically during the first SEND or REGISTER.</p> <p>NO The application has to issue a LOGON call.</p>						
BLACKLIST-PENALTY-TIME	5m n nS nM nH	R	z	u	w	v	b
	<p>Define the length of time a participant is placed on the PARTICIPANT-BLACKLIST to prevent a denial-of-service attack.</p> <p><i>n</i> Same as <i>nS</i>.</p> <p><i>nS</i> Non-activity time in seconds (max. 2147483647).</p> <p><i>nM</i> Non-activity time in minutes (max. 35791394).</p> <p><i>nH</i> Non-activity time in hours (max. 596523).</p> <p>See <i>Protecting a Broker against Denial-of-Service Attacks</i> in the platform-specific broker administration documentation.</p>						
BROKER-ID	A32	R	z	u	w	v	b
	<p>Identifies the broker to which the attribute file applies. The broker ID must be unique per machine.</p> <p>Note: The numerical section of the BROKER-ID is no longer used to determine the DBID in the EntireX Broker kernel with Entire Net-Work transport (NET). To determine the DBID, use attribute NODE in the DEFAULTS=NET section of the attribute file.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
CLIENT-NONACT	<u>15M</u> <i>n</i> <i>nS</i> <i>nM</i> <i>nH</i>	R	z	u	w	v	b
Define the non-activity time for clients. <i>n</i> Same as <i>nS</i> . <i>nS</i> Non-activity time in seconds (max. 2147483647). <i>nM</i> Non-activity time in minutes (max. 35791394). <i>nH</i> Non-activity time in hours (max. 596523). A client that does not issue a broker request within the specified time limit is treated as inactive and all resources for the client are freed.							
CMDLOG	<u>NO</u> YES	O	z	u	w	v	b
NO Command logging will not be available in the broker. YES Command logging features will be available in the broker.							
CMDLOG-FILE-SIZE	<u>1024</u> <i>n</i>	O	z	u	w	v	b
Defines the maximum size of the file that the command log is written to, in kilobytes. The value must be 1024 or higher. The default value is 1024. When one command log file grows to this size, broker starts writing to the other file. For more details, see <i>Command Logging in EntireX</i> .							
CONTROL-INTERVAL	<u>60s</u> <i>n</i> <i>nS</i> <i>nM</i> <i>nH</i>	O	z	u	w	v	b
Defines the time interval of time-driven broker-to-broker calls. 1. It controls the time between handshake attempts. 2. The standby broker will check the status of the standard broker after the elapsed CONTROL-INTERVAL time. <i>n</i> Same as <i>nS</i> . <i>nS</i> Interval in seconds (max. 2147483647). <i>nM</i> Interval in minutes (max. 35791394). <i>nH</i> Interval in hours (max. 596523). The minimum value is 16 seconds. We strongly recommend the default value (60 seconds), except for very slow machines.							
CONV-DEFAULT	<u>UNLIM</u> <i>n</i>	O	z	u	w	v	b
Default number of conversations that are allocated for every service.							

Attribute	Values	Opt/ Req	Operating System							
			z/OS	UNIX	Windows	zVSE	BS2000			
	<p>UNLIM The number of conversations is restricted only by the number of conversations globally available. Precludes the use of NUM-CONVERSATION.</p> <p><i>n</i> Number of conversations.</p> <p>This value can be overridden by specifying a CONV-LIMIT for the service. A value of 0 (zero) is invalid.</p>									
DEFERRED	NO YES	O	z	u	w	v	b	<p>Disable or enable deferred processing of units of work.</p> <p>NO Units of work cannot be sent to the service until it is available.</p> <p>YES Units of work can be sent to a service that is not up and registered. They will be processed when the service becomes available.</p>		
DYNAMIC-MEMORY-MANAGEMENT	YES NO	O	z	u	w	v	b	<p>YES An initial portion of memory is allocated at broker startup based on defined NUM-* attributes or internal default values if no NUM-* attributes have been defined. More memory is allocated without broker restart if there is a need to use more storage. Unused memory is deallocated. The upper limit of memory consumption can be defined by the attribute MAX-MEMORY. See <i>Dynamic Memory Management</i> under <i>Broker Resource Allocation</i> in the general administration documentation.</p> <p>NO All memory is allocated at broker startup based on the calculation from the defined NUM-* attributes. Size of memory cannot be changed. This was the known behavior of EntireX 7.3 and earlier.</p> <p>If you run your broker with attribute DYNAMIC-MEMORY-MANAGEMENT=YES, the following attributes are not needed:</p> <ul style="list-style-type: none"> ■ CONV-DEFAULT ■ NUM-PUBLISHER ■ HEAP-SIZE ■ NUM-SERVER ■ LONG-BUFFER-DEFAULT ■ NUM-SERVICE-EXTENSION ■ PUBLICATION-DEFAULT ■ NUM-SERVICE ■ SERVER-DEFAULT ■ NUM-SHORT[-BUFFER] ■ SHORT-BUFFER-DEFAULT ■ NUM-SUBSCRIBER-TOTAL ■ SUBSCRIBER-DEFAULT ■ NUM-SUBSCRIBER ■ NUM-CLIENT ■ NUM-TOPIC-EXTENSION 		

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<ul style="list-style-type: none"> ■ NUM-CMDLOG-FILTER ■ NUM-TOPIC-TOTAL ■ NUM-COMBUF ■ NUM-TOPIC ■ NUM-CONV[ERSATION] ■ NUM-UOW MAX-UOW MUOW ■ NUM-LONG[-BUFFER] ■ NUM-WQE ■ NUM-PUBLICATION <p>Caution: However, if one of these attributes is defined, it determines the allocation size of that particular broker resource.</p>						
DYNAMIC-WORKER-MANAGEMENT	<u>NO</u> YES	O	z	u	w	b	
	<p>NO All worker tasks are started at broker startup. The number of worker tasks is defined by NUM-WORKER. After this initial step, no further worker tasks can be started. This is default and simulates the behavior of EntireX version 8.0 and earlier.</p> <p>YES As above, the initial portion of worker tasks started at broker startup is determined by NUM-WORKER. However, if there is a need to handle an increased workload, additional worker tasks can be started at runtime without restarting broker. Conversely, if a worker task remains unused, it is stopped. The upper and lower limit of running worker tasks can be defined by the attributes WORKER-MIN and WORKER-MAX.</p> <p>If you run broker with DYNAMIC-WORKER-MANAGEMENT=YES, the following attributes are useful to optimize the overall processing:</p> <ul style="list-style-type: none"> ■ WORKER-MAX ■ WORKER-MIN ■ WORKER-NONACT ■ WORKER-QUEUE-DEPTH ■ WORKER-START-DELAY <p>The attribute NUM-WORKER defines the initial number of worker tasks started during initialization. See <i>Dynamic Worker Management</i> under <i>Broker Resource Allocation</i> in the general administration documentation.</p>						
FORCE	<u>NO</u> YES	O		u			
	<p>NO Go down with error if IPC resources still exist.</p> <p>YES Clean up the left-over IPC resources of a previous run.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	<p>Note:</p> <ol style="list-style-type: none"> If broker is started twice, the second instance will kill the first by removing the IPC resources. For BS2000/OSD, z/OS and z/VSE, see separate attribute FORCE in section <i>Adabas SVC/Entire Net-Work-specific Attributes</i>. 						
HEAP-SIZE	<u>1024</u> n	O	z	u	w	v	b
	<p>Defines the size of the internal heap in KB. Not required if you are using DYNAMIC-MEMORY-MANAGEMENT. If you are <i>not</i> using dynamic memory management, we strongly recommend specifying - as a minimum - the default value of 1024 KB.</p>						
ICU-CONVERSION	<u>YES</u> NO	O	z	u	w	v	b
	<p>Disable or enable ICU conversion. Default for z/VSE is NO; other platforms YES.</p> <p>YES ICU is loaded and available for conversion. It is a prerequisite for SAGTCHA and SAGTRPC.</p> <p>NO ICU is not loaded and not available for conversion. SAGTCHA and SAGTRPC cannot be used.</p> <p>If any of the broker service definitions uses the internationalization approach "ICU conversion", that is, the conversion methods SAGTCHA and SAGTRPC are defined by the service-specific or topic-specific attribute CONVERSION, ICU-CONVERSION must be set to "YES". The internationalization approaches "Translation", "Translation User Exit" and "SAGTRPC User Exit" do not require ICU conversion. If all broker service definitions use these internationalization approaches, ICU-CONVERSION can be set to "NO".</p> <p>ICU requires additional storage to run properly. If ICU conversion is not needed, setting ICU-CONVERSION to "NO" will help to avoid unnecessary storage consumption.</p>						
ICU-SET-DATA-DIRECTORY	<u>YES</u> NO	O		u	w		
	<p>Disable or enable ICU custom converter usage. Not defined for mainframe platforms.</p> <p>YES The broker tries to locate ICU custom converters with the mechanism defined by the platform, see <i>Building and Installing ICU Custom Converters</i> in the platform-specific administration documentation.</p> <p>NO Use of ICU custom converters is not possible.</p>						
IPV6	<u>YES</u> <u>NO</u>	O	z	u	w		b

Attribute	Values	Opt/Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<p>YES Establish SSL and TCP/IP transport in IPv6 and IPv4 networks according to the TCP/IP stack configuration.</p> <p>NO Establish SSL and TCP/IP transport in IPv4 network only.</p> <p>This attribute applies to EntireX version 9.0 and above.</p>						
LONG-BUFFER-DEFAULT	<u>UNLIM</u> <i>n</i>	O	z	u	w	v	b
	<p>Number of long buffers to be allocated for each service or topic.</p> <p>UNLIM The number of long message buffers is restricted only by the number of buffers globally available. Precludes the use of NUM-LONG-BUFFER.</p> <p><i>n</i> Number of buffers.</p> <p>This value can be overridden by specifying a LONG-BUFFER-LIMIT for the service. A value of 0 (zero) is invalid.</p>						
MAX-MEMORY	<u>0</u> <i>n</i> <i>nK</i> <i>nM</i> <i>nG</i> UNLIM	O	z	u	w	v	b
	<p>Defines the upper limit of memory allocated by broker if DYNAMIC-MEMORY-MANAGEMENT=YES has been defined.</p> <p>0, UNLIM No memory limit.</p> <p>others Defines the maximum limit of allocated memory. If limit is exceeded, error 671 "Requested allocation exceeds MAX-MEMORY" is generated.</p>						
MAX-MESSAGE-LENGTH	<u>2147483647</u> <i>n</i>	O	z	u	w	v	b
	<p>Maximum message size that the broker kernel can process. This value is transport-dependent. The default value represents the highest positive number that can be stored in a four-byte integer.</p>						
MAX-MESSAGES-IN-UOW	<u>16</u> <i>n</i>	O	z	u	w	v	b
	<p>Maximum number of messages in a UOW (or publication).</p>						
MAX-MSG	See MAX-MESSAGE-LENGTH.						
MAX-UOW-MESSAGE-LENGTH	See MAX-MESSAGE-LENGTH.						
MAX-UOWS	<u>0</u> <i>n</i>	O	z	u	w	v	b
	<p>The maximum number of UOWs that can be concurrently active broker-wide. The default value is 0 (zero), which means that the broker will process only messages that are not part of a unit of work. If UOW processing is to be done by any service, a MAX-UOWS value must be 1 or larger for the broker.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	The MAX-UOWS value for the service will default to the value set for the broker. NUM-UOW is an alias of this parameter.						
MESSAGE-CASE	NONE UPPER LOWER	O	z	u	w	v	b
	<p>Indicates if certain error message texts returned by the broker to its clients or written by the broker to its log file are to be in mixed case, uppercase, or lowercase.</p> <p>NONE No changes are made to message case. UPPER Messages are changed to uppercase. LOWER Messages are changed to lowercase.</p>						
MUOW	See NUM-UOW.						
NEW-UOW-MESSAGES	YES NO	O	z	u	w	v	b
	<p>YES New UOW messages are allowed. NO New UOW messages are not allowed.</p> <p>This applies to UOW when using Persistence and should not be used for non-persistent UOWs. A usage example could be the following:</p> <p>The broker persistent store reaches capacity and the broker shuts down. You can set NEW-UOW-MESSAGES to "NO" to prevent new UOW messages from being added after a broker restart. This action allows only consumption (not production) of UOWs to occur after broker restart. After the persistent store capacity has been sufficiently reduced, the EntireX Broker administrator can issue a CIS command, see ALLOW-NEUOWMSGs under <i>Broker CIS Data Structures</i> in the ACI Programming documentation. This action allows new UOW messages to be sent to the broker. Reset attribute NEW-UOW-MESSAGES to "YES", which permits new UOW messages to be produced in subsequent broker sessions.</p>						
NUM-BLACKLIST-ENTRIES	256 n	O	z	u	w	v	b
	<p>Number of entries in the participant blacklist. Default value is 256 entries. Together with BLACKLIST-PENALTY-TIME and PARTICIPANT-BLACKLIST, this attribute is used to protect a broker running with SECURITY=YES against denial-of-service attacks. See <i>Protecting a Broker against Denial-of-Service Attacks</i> in the platform-specific broker administration documentation.</p>						
NUM-CLIENT	n	R	z	u	w	v	b
	<p>Number of clients that can access the broker concurrently. A value of 0 (zero) is invalid.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
NUM-CMDLOG-FILTER	1 n	O	z	u	w	v	b
<p>Maximum number of filters that can be specified simultaneously.</p> <p>Tip: We recommend you limit this value to the number of services that are being monitored. Minimum value is 1. A value of zero is invalid when the attribute CMDLOG is set to "YES". See <i>Command Logging in EntireX</i> for more information.</p>							
NUM-COMBUF	1 - 999999	R	z	u	w	v	b
<p>Determines the maximum number of communication buffers available for processing commands arriving in the broker kernel. The size of one communication buffer is usually 16 KB split into 32 slots of 512 bytes, but it ultimately depends on the hardware architecture of your CPU. A value of 0 (zero) is invalid.</p>							
NUM-CONVERSATION or NUM-CONV	n AUTO	R	z	u	w	v	b
<p>Defines the number of conversations that can be active concurrently. The number specified should be high enough to account for both conversational and non-conversational requests. (Non-conversational requests are treated internally as one-conversation requests.)</p> <p><i>n</i> Number of conversations.</p> <p>AUTO Uses the CONV-DEFAULT and the service-specific CONV-LIMIT values to calculate the number of conversations. The values used in the calculation must not be set to "UNLIM".</p> <p>Note:</p> <ol style="list-style-type: none"> 1. A value of 0 (zero) is invalid. If a wildcard service is defined in the service-specific section of the attribute file, the value of AUTO is invalid. 2. See <i>Wildcard Service Definition</i> under <i>Broker Attributes</i> in the platform-independent administration documentation. 							
NUM-LONG-BUFFER or NUM-LONG	n AUTO	R	z	u	w	v	b
<p>Defines the number of long message containers. Long message containers have a fixed length of 4096 bytes and are used to store requests that are larger than 2048 bytes. Storing a request of 8192 bytes, for example, would require two long message containers.</p> <p><i>n</i> Number of buffers.</p> <p>AUTO Uses the LONG-BUFFER-DEFAULT and the service-specific LONG-BUFFER-LIMIT values to calculate the number of long</p>							

Attribute	Values	Opt/ Req	Operating System									
			z/OS	UNIX	Windows	z/VSE	BS2000					
	<p>message buffers. The values used in the calculation must not be set to "UNLIM".</p> <p>A value of 0 (zero) is invalid.</p> <p>In <i>non-conversational</i> mode, message containers are released as soon as the client receives a reply from the server. If no reply is requested, message containers are released as soon as the server receives the client request.</p> <p>In <i>conversational</i> mode, the last message received is always kept until a new one is received.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. If a catch-all service is defined in the service-specific section of the attribute file, the value of AUTO is invalid. 2. See <i>Wildcard Service Definition</i> under <i>Broker Attributes</i> in the platform-independent administration documentation. 											
NUM-PUBLICATION	<i>n</i> AUTO	O	z	u	w	v	b	<p>Defines the number of publications that can be active concurrently.</p> <p><i>n</i> Number of publications</p> <p>AUTO Uses the PUBLICATION-DEFAULT and the topic-specific PUBLICATION-LIMIT to calculate the number of publications. The values used in the calculation must not be set to "UNLIM"</p> <p>Note:</p> <ol style="list-style-type: none"> 1. A value of 0 (zero) is invalid. 2. If a wildcard topic is defined in the topic-specific section of the attribute file, the value of AUTO is invalid. 				
NUM-PARTICIPANT-EXTENSION	<i>n</i>	O	z	u	w	v	b	<p>Defines the number of participant extensions to link participants as clients and servers.</p> <p><i>n</i> Number of participant extensions</p> <p><i>not specified</i> If this attribute is not set, the default value is calculated based on NUM-CLIENT and NUM-SERVER.</p>				

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	A value of 0 (zero) is invalid.						
NUM-PUBLISHER	<i>n</i>	O	z	u	w	v	b
	Number of publishers that can access the broker concurrently. A value of 0 (zero) is invalid.						
NUM-SERVER	<i>n</i> AUTO	R	z	u	w	v	b
	<p>Defines the number of servers that can offer services concurrently using the broker. This is <i>not</i> the number of services that can be registered to the broker (see NUM-SERVICE).</p> <p><i>n</i> Number of servers.</p> <p>AUTO Uses the SERVER-DEFAULT and the service-specific SERVER-LIMIT values to calculate the number of servers. The values used in the calculation must not be set to "UNLIM".</p> <p>Note:</p> <ol style="list-style-type: none"> Setting this value higher than the number of services allows the starting of server replicas that provide the same service. A value of 0 (zero) is invalid. If a wildcard service is defined in the service-specific section of the attribute file, the value of AUTO is invalid. See <i>Wildcard Service Definition</i> under <i>Broker Attributes</i> in the platform-independent administration documentation. 						
NUM-SERVICE	<i>n</i>	R	z	u	w	v	b
	Defines the number of services that can be registered to the broker. This is <i>not</i> the number of servers that can offer the services (see NUM-SERVER). A value of 0 (zero) is invalid.						
NUM-SERVICE-EXTENSION	<i>n</i> AUTO	O	z	u	w	v	b
	<p>Defines the number of service extensions to link servers to services.</p> <p><i>n</i> Number of service extensions.</p> <p>AUTO Uses the value specified or calculated for NUM-SERVER + NUM-CLIENT, plus an extra cushion.</p> <p><i>not specified</i> If this attribute is not set, the default value is NUM-SERVER multiplied by NUM-SERVICE.</p> <p>The minimum value is NUM-SERVER.</p> <p>The maximum value is NUM-SERVER multiplied by NUM-SERVICE.</p> <p>Caution is recommended with this attribute:</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<ul style="list-style-type: none"> ■ Set this attribute only if the storage resources allocated for service extensions need to be restricted. ■ Note that the value $\langle n \rangle$ allows only the specified number of server instances of $\langle n \rangle$ to be used. ■ Value AUTO will calculate the number of allowed server instances from NUM-SERVER, which itself might be set to AUTO. In this case, this also considers the value of SERVER-DEFAULT and even the individual SERVER-LIMIT for each service definition (see note below). 						
NUM-SHORT-BUFFER or NUM-SHORT	n AUTO	R	z	u	w	v	b
	<p>Defines the number of short message containers. Short message containers have a fixed length of 256 bytes and are used to store requests of no more than 2048 bytes. To store a request of 1024 bytes, for example, would require four short message containers.</p> <p>n Number of buffers.</p> <p>AUTO Uses the SHORT-BUFFER-DEFAULT and the service-specific SHORT-BUFFER-LIMIT values to calculate the number of short message buffers. The values used in the calculation must not be set to "UNLIM".</p> <p>Note:</p> <ol style="list-style-type: none"> 1. In <i>non-conversational</i> mode, message containers are released as soon as the client receives a reply from the server. If no reply is requested, message containers are released as soon as the server receives the client request. 2. In <i>conversational</i> mode, the last message received is always kept until a new one is received. 3. If a wildcard service is defined in the service-specific section of the attribute file, the value of AUTO is invalid. 4. See <i>Wildcard Service Definition</i> under <i>Broker Attributes</i> in the platform-independent administration documentation. 						
NUM-SUBSCRIBER	n AUTO	O	z	u	w	v	b
	<p>Defines the number of subscribers that can be active concurrently.</p> <p>n Number of subscribers.</p> <p>AUTO Uses the SUBSCRIBER-DEFAULT and the topic-specific SUBSCRIBER-LIMIT to calculate the number of subscribers.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	A value of 0 (zero) is invalid. If a wildcard topic is defined in the topic-specific section of the attribute file, the value of AUTO is invalid.						
NUM-SUBSCRIBER-TOTAL	<i>n</i> AUTO	O	z	u	w	v	b
	<p>Defines the total number of subscribers that can be durably subscribed. Their subscription information is saved in the persistent store.</p> <p><i>n</i> Total number of subscribers.</p> <p>AUTO Uses the value defined or calculated for NUM-SUBSCRIBER.</p> <p>A value of 0 (zero) is invalid. This value must be greater than or equal to the NUM-SUBSCRIBER value. Parameter is required if SUBSCRIBER-STORE=PSTORE is defined.</p>						
NUM-TOPIC	<i>n</i>	O	z	u	w	v	b
	Defines the number of topics that can be active in the broker. A value of 0 (zero) is invalid.						
NUM-TOPIC-EXTENSION	<i>n</i> AUTO	O	z	u	w	v	b
	<p>Defines the number of topic extensions to link subscribers to topics.</p> <p><i>n</i> Number of topic extensions.</p> <p>AUTO Uses the value specified for NUM-SUBSCRIBER + NUM-PUBLISHER, plus an extra cushion.</p> <p><i>not specified</i> If this attribute is not set, the default value is NUM-SUBSCRIBER multiplied by NUM-TOPIC.</p> <p>The minimum value is NUM-SUBSCRIBER.</p> <p>The maximum value is NUM-SUBSCRIBER multiplied by NUM-TOPIC.</p> <p>Caution is recommended with this attribute.</p> <ul style="list-style-type: none"> ■ Set this attribute only if the storage resources allocated for topic extensions need to be restricted. ■ Note that the value <<i>n</i>> allows only the specified number of topic instances of <<i>n</i>> to be used. ■ Value AUTO calculates the number of allowed server instances from NUM-SUBSCRIBER, which itself might set to AUTO. In this case, this also considers the value of SERVER-DEFAULT and even the individual SERVER-LIMIT for each topic definition (see note below). 						
NUM-TOPIC-TOTAL	<i>n</i> AUTO	O	z	u	w	v	b
	Defines the total number of topics for which durable subscribers are allowed.						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<p>n Total number of topics that allow durable subscriptions. AUTO Uses the value defined for NUM-TOPIC.</p> <p>This value must be greater than or equal to the NUM-TOPIC value. This parameter is required if SUBSCRIBER-STORE=PSTORE is defined.</p>						
NUM-UOW	<u>0</u> n	O	z	u	w	v	b
	<p>The maximum number of UOWs that can be concurrently active broker-wide. The default value is 0 (zero), which means that the broker will process only messages that are not part of a unit of work. If UOW processing is to be done by any service, a NUM-UOW value must be 1 or larger for the broker. (MAX-UOWS is an alias for this attribute.)</p> <p>The NUM-UOW value for the service will default to the value set for the broker.</p>						
NUM-WORKER	<u>1</u> n (max. 10)	R	z	u	w	v	b
	<p>Number of worker tasks that the broker can use. The number of worker tasks determines the number of functions (SEND, RECEIVE, REGISTER, etc.) that can be processed concurrently. At least one worker task is required; this is the default value.</p>						
NUM-WQE	1 - 32768	R	z	u	w	v	b
	<p>Maximum number of requests that can be processed by the broker in parallel, over all transport mechanisms.</p> <p>Each broker command is assigned a worker queue element, regardless of the transport mechanism being used. This element is released when the user has received the results of the command, including the case where the command has timed out.</p>						
PARTICIPANT-BLACKLIST	<u>YES</u> NO	R	z	u	w	v	b
	<p>Determines whether participants attempting a denial-of-service attack on the broker are to be put on a blacklist.</p> <p>YES Create a participant blacklist. NO Do not create a participant blacklist.</p> <p>See <i>Protecting a Broker against Denial-of-Service Attacks</i> in the platform-specific broker administration documentation.</p>						
PARTNER-CLUSTER-ADDRESS	A32	R	z	u	w	v	b
	<p>This is the address of the load/unload broker in transport-method-style. Transport methods TCP and SSL are supported. See <i>Transport-method-style</i></p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	<p><i>Broker ID</i> for more details. This attribute is required if the attribute RUN-MODE is specified.</p>						
POLL	YES NO	O	z	u		v	
	<p>In earlier EntireX versions, the maximum number of TCP/IP connections per communicator was limited; see <i>Maximum TCP/IP Connections per Communicator</i> under <i>Broker Resource Allocation</i> in the general administration documentation for platform-specific list. With attribute POLL introduced in EntireX version 9.0, this restriction can be lifted under z/OS, UNIX and z/VSE.</p> <p>YES The poll() system call is used to lift the resource restrictions with select() in multiplexing file descriptor sets.</p> <p>NO This setting is used to run the compatibility mode in Broker. The poll() system call is not used. The limitations described under <i>Maximum TCP/IP Connections per Communicator</i> under <i>Broker Resource Allocation</i> in the general administration documentation apply.</p> <p>Note: Setting this attribute to YES increases CPU consumption. POLL=YES is only useful if you need more than the maximum number of TCP/IP connections per communicator; we recommend POLL=NO to reduce CPU consumption.</p>						
PSTORE	NO HOT COLD	O	z	u	w	v	b
	<p>Defines the status of the persistent store at broker startup, including the condition of persistent units of work (UOWs). With any value other than "NO", PSTORE-TYPE must be set.</p> <p>NO No persistent store.</p> <p>HOT Persistent UOWs are restored to their prior state during initialization.</p> <p>COLD Persistent UOWs are not restored during initialization, and the persistent store is considered empty.</p> <p>Note: For a hot or cold start, the persistent store must be available when your broker is restarted.</p>						
PSTORE-REPORT	NO YES	O	z	u	w	v	b
	<p>Determines whether PSTORE report is created.</p> <p>NO Do not create the PSTORE report file.</p> <p>YES Create the PSTORE report file.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	See also <i>Persistent Store Report</i> under <i>Concepts of Persistent Messaging</i> in the general administration documentation.						
PSTORE -TYPE	DIV (z/OS) CTREE (UNIX, Windows) Adabas (all platforms) FILE (UNIX, Windows)	O	z	u	w	v	b
	<p>Describes the type of persistent store driver required.</p> <p>DIV Data in Virtual. z/OS only, and default on this platform. See <i>DIV-specific Attributes</i> below and <i>Implementing a DIV Persistent Store</i> under <i>Managing the Broker Persistent Store</i> in the z/OS administration documentation.</p> <p>CTREE c-tree database. UNIX and Windows only. See <i>c-tree-specific Attributes</i> and <i>c-tree Database as Persistent Store</i> in the UNIX and Windows administration documentation.</p> <p>ADABAS Adabas. All platforms. See also <i>Adabas-specific Attributes</i> (below) and <i>Managing the Broker Persistent Store</i>.</p> <p>FILE B-Tree database. UNIX and Windows only. No longer supported.</p>						
PSTORE -VERSION	2 3 4	O	z	u	w	v	b
	<p>Determines the version of the persistent store. PSTORE=COLD is not needed to upgrade the PSTORE to version 3. Any broker restart with PSTORE-VERSION=3 will upgrade the PSTORE version.</p> <p>PSTORE-VERSION=3 is needed for ICU support. We recommended setting PSTORE-VERSION=3.</p> <p>PSTORE-VERSION=4 is needed to use the DIV PSTORE handler introduced with version 9.0. It requires much less configuration data.</p> <p>Caution:</p> <ul style="list-style-type: none"> ■ If you go back to PSTORE-VERSION=2 after upgrading to PSTORE-VERSION=3, the broker will only process data previously created with version 2. No version 3 data will be accessible. ■ If you change the DIV PSTORE from version 3 to 4, perform a COLD restart for the change to take effect, or run PSTORE UNLOAD/LOAD first. 						
PUBLICATION-DEFAULT	n UNLIM	O	z	u	w	v	b
	Default number of publications that are allocated for every topic.						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<p><i>n</i> Number of publications.</p> <p>UNLIM The number of publications is restricted only by the number of publications globally available. Precludes the use of NUM-PUBLICATION=AUTO.</p> <p>This value can be overridden by specifying a PUBLICATION-LIMIT for the topic. A value of 0 (zero) is invalid.</p>						
PUBLICATION-LIFETIME	<i>n</i> <i>nS</i> <i>nM</i> <i>nH</i> <i>nD</i> <i>nY</i>	O	z	u	w	v	b
	<p>Lifetime of a publication in absolute time units. Publications are retained by broker until they are either received by all subscribers or the publication lifetime has expired.</p> <p><i>n</i> Same as <i>nS</i>.</p> <p><i>nS</i> Publication lifetime in seconds (max. 2147483647).</p> <p><i>nM</i> Publication lifetime in minutes (max. 35791394).</p> <p><i>nH</i> Publication lifetime in hours (max. 596523).</p> <p><i>nD</i> Publication lifetime in days (max. 24855).</p> <p><i>nY</i> Publication lifetime in years (max. 68).</p> <p>The publication lifetime is calculated even for periods of time when broker is stopped.</p>						
PUBLISH-AND-SUBSCRIBE	YES NO	O	z	u	w	v	b
	Run publish and subscribe subsystem. Subsystem requires a license.						
RUN-MODE	STANDARD STANDBY PSTORE-LOAD PSTORE-UNLOAD	O	z	u	w	v	b
	<p>Determines the initial run mode of the broker.</p> <p>STANDARD Default value. Normal mode.</p> <p>STANDBY Deprecated. Supported for compatibility reasons.</p> <p>PSTORE-LOAD Broker will run as load broker to write Persistent Store data to a new persistent store. See also <i>Migrating the Persistent Store</i> in the general administration documentation.</p> <p>PSTORE-UNLOAD Broker will run as unload broker to read an existing persistent store and pass the data to a broker running</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<p>in PSTORE-LOAD mode. See also <i>Migrating the Persistent Store</i> in the general administration documentation.</p>						
SECURITY	NO YES	O	z	u	w	v	b
	<p>Determines whether the EntireX Broker security exits are activated.</p> <p>NO The security exits are not activated.</p> <p>YES The security exits are activated. If the security routines cannot be activated, the broker will not start.</p> <p>Broker trace reports the type of security which is active and from where the security module USRSEC is loaded:</p> <ul style="list-style-type: none"> ■ EntireX Security ■ User-written USRSEC. 						
SECURITY - PATH	A255	O	z	u	w		b
	<p>Full path and file name of an executable file (for example, DLL for Windows or shared library for UNIX) containing the user security exit which the kernel will load and call. Example:</p> <pre>SECURITY - PATH=usersec.dll</pre> <p>This assumes the DLL is in the default path. Or:</p> <pre>SECURITY - PATH=c:\brokerexit\yoursecu.dll</pre> <p>If the path name contains spaces, enclose it in quotation marks. Example:</p> <pre>SECURITY - PATH="c:\Software AG\broker exit\yoursecu.dll"</pre> <p>Note: This attribute is used only when implementing a user-written security exit.</p>						
SERVER - DEFAULT	n UNLIM	O	z	u	w	v	b
	<p>Default number of servers that are allowed for every service.</p> <p><i>n</i> Number of servers.</p> <p>UNLIM The number of servers is restricted only by the number of servers globally available. Precludes the use of NUM - SERVER=AUTO.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	This value can be overridden by specifying a SERVER-LIMIT for the service. A value of 0 (zero) is invalid.						
SERVICE-UPDATES	YES NO	O	z	u	w	v	b
	Switch on/off the automatic update mode of the broker. YES The broker reads the attribute file whenever a service registers for the first time. This allows the broker to honor modifications in the attribute file <i>without</i> a restart. The attribute file is read only when the first server registers for a particular service; it is not reread when a second replica is activated. NO The attribute file is read only once during broker startup. Any changes to the attribute file will be honored only if the broker is restarted.						
SHORT-BUFFER-DEFAULT	UNLIM <i>n</i>	O	z	u	w	v	b
	Number of short buffers to be allocated for each service. UNLIM The number of short message buffers is restricted only by the number of buffers globally available. Precludes the use of NUM-SHORT-BUFFER=AUTO. <i>n</i> Number of buffers. This value can be overridden by specifying a SHORT-BUFFER-LIMIT for the service. A value of 0 (zero) is invalid.						
SSLPORT	See PORT.						
SSL-RESTART	See RESTART.						
SSL-RETRY-LIMIT	See RETRY-LIMIT.						
SSL-RETRY-TIME	See RETRY-TIME.						
SSTORE SSTORE-TYPE	These parameters are obsolete. The subscriber store in a secondary store is no longer supported. We recommend you use the PSTORE persistent store to store your subscriber data. For this, set broker-specific parameter SUBSCRIBER-STORE=PSTORE.						
STORAGE-REPORT	NO YES	O	z	u	w	v	b
	Create a storage report about broker memory usage. NO Do not create the storage report. YES Create the storage report. See <i>Storage Report</i> under <i>Broker Resource Allocation</i> in the general administration documentation.						
STORE	OFF BROKER	O	z	u	w	v	b

Attribute	Values	Opt/ Req	Operating System				
			zOS	UNIX	Windows	zVSE	BS2000
	<p>Sets the default STORE attribute for all units of work. This attribute can be overridden by the STORE field in the Broker ACI control block.</p> <p>OFF Units of work are not persistent. BROKER Units of work are persistent.</p>						
SUBSCRIBER-DEFAULT	<i>n</i> UNLIM	O	z	u	w	v	b
	<p>Default number of subscribers that are allowed for every topic.</p> <p><i>n</i> Number of subscribers UNLIM The number of subscribers is restricted only by the number of subscribers globally available. Precludes the use of NUM-SUBSCRIBER=AUTO.</p> <p>This value can be overridden by specifying a SUBSCRIBER-LIMIT for the topic. A value of 0 (zero) is invalid.</p>						
SUBSCRIBER-STORE	NO PSTORE	O	z	u	w	v	b
	<p>Determines whether subscriber information is stored and where.</p> <p>NO No subscriber information is to be stored. PSTORE Save subscriber data in PSTORE.</p> <p>Tip: The subscriber store in a secondary store is no longer supported. We recommend you use the PSTORE persistent store to store your subscriber data.</p>						
TCPPORT	See PORT.						
SWAP-OUT-NEW-UOWS	NO YES	O	z	u	w	v	b
	<p>Determines whether conversations with units of work remain in memory or are swapped. See also <i>Swapping out New Units of Work</i> in the general administration documentation.</p> <p>NO All conversations with UOWs remain in memory. YES Conversations with UOWs (STORE=BROKER) created by a client and finished with an EOC without being accepted by a server will be swapped out of memory. The data is persisted on PSTORE and there is no need to keep it in memory unless a server wants to receive this data.</p> <p>Note: See service-specific attribute MIN-UOW-CONVERSATIONS-IN-MEMORY for defining a minimum number of UOW conversations kept in memory to</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<p>improve the performance for servers receiving new UOW conversations without waiting for swap-in of data from PSTORE. During broker restart, all new and unassigned UOW conversations remain in PSTORE only. This reduces the restart time significantly.</p> <p>See also <i>Swapping out New Units of Work</i> in the general administration documentation.</p>						
TCP-RESTART	See RESTART.						
TCP-RETRY-LIMIT	See RETRY-LIMIT.						
TCP-RETRY-TIME	See RETRY-TIME.						
TOPIC-UPDATES	<u>YES</u> NO	O	z	u	w	v	b
	<p>Switch on/off automatic update of topic defaults in the broker.</p> <p>YES The broker reads the attribute file whenever a topic is being subscribed for the first time. This allows broker to honor modifications in the attribute file without a restart. The attribute file is read only when the first subscriber subscribes to a particular topic. It is not reread when a second subscriber subscribes to the same topic.</p> <p>NO The attribute file is read only once during broker startup. Any changes to the attribute file will be honored only if the broker is restarted.</p>						
TRACE-DD	A255	O	z				
	<p>A string containing data set attributes enclosed in quotation marks. These attributes describe the trace output file and must be defined if you are using a GDG (generation data group) as output data set. See <i>Flushing Trace Data to a GDG Data Set</i> under <i>Tracing EntireX Broker</i>.</p> <p>The following keywords are supported as part of the TRACE-DD value:</p> <ul style="list-style-type: none"> ■ DATACLAS ■ DCB including BLKSIZE, DSORG, LRECL, RECFM ■ DISP ■ DSN ■ MGMTCLAS ■ SPACE ■ STORCLAS ■ UNIT <p>Refer to your JCL Reference Manual for a complete description of the syntax.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	Example: <pre>TRACE-DD = "DSNAME=EXX.GDG, DCB=(BLKSIZE=1210,DSORG=PS,LRECL=121,RECFM=FB), DISP=(NEW,CATLG,CATLG), SPACE=(CYL,(100,10)), STORCLAS=SMS"</pre>						
TRACE - LEVEL	0 - 4	O	z	u	w	v	b
	<p>The level of tracing to be performed while the broker is running.</p> <p>0 No tracing. Default value.</p> <p>1 Traces incoming requests, outgoing replies, resource usage and conversion errors if SAGTRPC is used for CONVERSION with the conversion options SUBSTITUTE -NONCONV or STOP.</p> <p>2 All of trace level 1, plus all main routines executed.</p> <p>3 All of trace level 2, plus all routines executed.</p> <p>4 All of trace level 3, plus Broker ACI control block displays.</p> <p>If you modify the TRACE - LEVEL attribute, you must restart the broker for the change to take effect. For temporary changes to TRACE - LEVEL without restarting the broker, use System Management Hub or ETBCMD.</p> <p>Trace levels 2, 3, and 4 should be used only when requested by Software AG support.</p>						
TRANSPORT	TCP SSL NET	O	z	u	w	v	b
	<p>The broker transport may be specified as any combination of one or more of the following methods:</p> <p>TCP TCP/IP is supported.</p> <p>SSL SSL or TLS is supported. This value is not supported for a broker under z/VSE.</p> <p>NET Entire Net-Work is supported. This value is not supported for a broker under UNIX or Windows.</p> <p>Examples:</p> <p>TRANSPORT=NET specifies that only the Entire Net-Work transport method will be supported by the broker.</p> <p>TRANSPORT=TCP - NET specifies that both the TCP/IP and Net-Work transport methods will be supported by the broker.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<p>TRANSPORT=TCP-SSL-NET specifies that the TCP/IP, SSL (or TLS), and Entire Net-Work transport methods will be supported by the broker.</p> <p>Section <i>TCP/IP-specific Attributes</i> (DEFAULTS=TCP) under <i>Broker Attributes</i> in the platform-independent administration documentation describes the parameters for each transport method.</p>						
TRAP - ERROR	<i>nnnn</i>	O	z	u	w		b
	<p>Where <i>nnnn</i> is the four-digit API error number that triggers the trace handler, for example 0007 (Service not registered). Leading zeros are not required. There is no default value.</p> <p>See <i>Deferred Tracing</i> in the platform-specific Broker administration documentation.</p>						
TRBUFNUM	<i>n</i>	O	z	u	w		b
	<p>Changes the trace to write trace data to internal trace buffers. <i>n</i> is the size of the trace buffer in 64 KB units. There is no default value.</p>						
TRMODE	WRAP	O	z	u	w		b
	<p>Changes the trace mode. "WRAP" is the only possible value. This value instructs broker to write the trace buffer (see TRBUFNUM) if an event occurs. This event is triggered by a matching TRAP - ERROR during request processing or when an exception occurs.</p>						
UMSG	See MAX-MESSAGES-IN-UOW.						
UOW-MSGS	See MAX-MESSAGES-IN-UOW.						
UWSTAT-LIFETIME	<u>no value</u> <i>n</i> [S] <i>n</i> M <i>n</i> H <i>n</i> D	O	z	u	w	v	b
	<p>The value to be added to the UWTIME (lifetime of associated UOW). If a value is entered, it must be 1 or greater; a value of 0 will result in an error. If no value is entered, the lifetime of the UOW <i>status</i> information will be the same as the lifetime of the UOW itself.</p> <p><i>n</i>S Number of seconds the UOW status exists longer than the UOW itself (max. 2147483647).</p> <p><i>n</i>M Number of minutes (max. 35791394).</p> <p><i>n</i>H Number of hours (max. 596523).</p> <p><i>n</i>D Number of days (max. 24855).</p> <p>The lifetime determines how much additional time the UOW status is retained in the persistent store and is calculated from the time at which the associated UOW enters any of the following statuses: "PROCESSED", "TIMEOUT", "BACKEDOUT", "CANCELLED", "DISCARDED". The</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	additional lifetime of the UOW status is calculated only when broker is executing. Value in UWSTAT-LIFETIME supersedes the value (if specified) in attribute UWSTATP. Note: If no unit is specified, the default unit is seconds. The unit does not have to be identical to the unit specified for UWTIME.						
UWSTATP	<u>Q</u> <i>n</i>	O	z	u	w	v	b
	Contains a multiplier used to compute the lifetime of a persistent status for the service. The UWSTATP value is multiplied by the UWTIME value (the lifetime of the associated UOW) to determine the length of time the status will be retained in the persistent store. 0 The status is not persistent. 1 - 254 Multiplied by the value of UWTIME to determine how long a persistent status will be retained. Note: This attribute has not been supported since EntireX version 7.3. Use UWSTAT-LIFETIME instead.						
UWTIME	<u>1D</u> <i>nS</i> <i>nM</i> <i>nH</i> <i>nD</i>	O	z	u	w	v	b
	Defines the default lifetime for units of work for the service. <i>nS</i> Number of seconds the UOW can exist (max. 2147483647). <i>nM</i> Number of minutes the UOW can exist (max. 35791394). <i>nH</i> Number of hours the UOW can exist (max. 596523). <i>nD</i> Number of days the UOW can exist (max. 24855). If the UOW is inactive - that is, is not processed within the time limit - it is deleted and given a status of "TIMEOUT". This attribute can be overridden by the UWTIME field in the Broker ACI control block. See <i>Timeout Considerations for EntireX Broker</i> in the general administration documentation.						
WAIT-FOR-ACTIVE-PSTORE	<u>NO</u> YES	O	z	u	w	v	b
	Determines whether broker should wait for the Adabas Persistent Store to become active. NO If broker should start with a PSTORE-TYPE=ADABAS and the database is not active or is not accessible, broker will stop.						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<p>YES If broker should start with a PSTORE - TYPE=ADABAS and the database is not active or is not accessible, broker will retry every 10 seconds to initiate communications with the PSTORE. Broker will reject any user requests until broker is able to contact the Adabas database.</p>						
WORKER-MAX	32 <i>n</i> (min. 1, max. 32)	O	z	u	w		b
	Maximum number of worker tasks the broker can use.						
WORKER-MIN	1 <i>n</i> (min. 1, max. 32)	O	z	u	w		b
	Minimum number of worker tasks the broker can use.						
WORKER-NONACT	70S <i>n</i> <i>n</i> S <i>n</i> M <i>n</i> H	O	z	u	w		b
	<p>Non-activity time to elapse before a worker tasks is stopped.</p> <p><i>n</i> Same as <i>n</i>S. <i>n</i>S Non-activity time in seconds (default 70, max. 2147483647). <i>n</i>M Non-activity time in in minutes (max. 35791394). <i>n</i>H Non-activity time in hours (max. 596523).</p> <p>Caution: A value of 0 (zero) is invalid. If you set this value too low, additional overhead is required for starting and stopping worker tasks. The default and recommended value is 70S.</p>						
WORKER-QUEUE-DEPTH	1 <i>n</i> (min. 1)	O	z	u	w		b
	Number of unassigned user requests in the input queue before another worker task gets started. The default and recommended value is 1. A higher value will result in longer broker response times.						
WORKER-START-DELAY	<i>internal-value</i> <i>n</i>	O	z	u	w		b
	<p><i>n</i> Delay is extended by <i>n</i> seconds.</p> <p>Delay after a successful worker task invocation before another worker task can be started to handle current incoming workload. This attribute is used to avoid the risk of recursive invocation of worker tasks, because starting a worker task itself causes workload increase.</p> <p>If no value is specified, an internal value calculated by the broker is used to optimize dynamic worker management. This calculated value is the maximum time required to start a worker task.</p>						

Service-specific Attributes

Each section begins with the keyword `DEFAULTS=SERVICE`. Services with common attribute values can be grouped together. The attributes defined in the grouping apply to all services specified within it. However, if a different attribute value is defined immediately following the service definition, that new value applies. See also the sections *Wildcard Service Definition* under *Broker Attributes* in the platform-independent administration documentation and *Service Update Modes* below the table.

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/SE	BS2000
CLASS	A32 (case-sensitive)	R	z	u	w	v	b
<p>Part of the name that identifies the service together with the <code>SERVER</code> and <code>SERVICE</code> attributes. <code>CLASS</code> must be specified first, followed immediately by <code>SERVER</code> and <code>SERVICE</code>.</p> <p>Classes starting with any of the following are reserved for use by Software AG and should not be used in customer-written applications: <code>BROKER</code>, <code>SAG</code>, <code>ENTIRE</code>, <code>ETB</code>, <code>RPC</code>, <code>ADABAS</code>, <code>NATURAL</code>. Valid characters for class name are letters <code>a-z</code>, <code>A-Z</code>, numbers <code>0-9</code>, hyphen and underscore. Do not use dollar, percent, period or comma. See also the restriction for <code>SERVICE</code> attribute names.</p>							
CLIENT-RPC-AUTHORIZATION	<u>N</u> Y	O	z				b
<p>Determines whether this service is subject to RPC authorization checking.</p> <p>N No RPC authorization checking is performed. Y RPC library and program name are appended to the authorization check performed by EntireX Security. Specify "YES" only to RPC-supported services.</p> <p>To allow conformity with Natural Security, the <code>CLIENT-RPC-AUTHORIZATION</code> parameter can optionally be defined with a prefix character as follows: <code>CLIENT-RPC-AUTHORIZATION= (YES,<prefix-character>)</code>.</p>							
CONV-LIMIT	<u>UNLIM</u> <i>n</i>	O	z	u	w	v	b
<p>Allocates a number of conversations especially for this service.</p>							

Attribute	Values	Opt/ Req	Operating System					
			z/OS	UNIX	Windows	zVSE	BS2000	
	<p>UNLIM The number of conversations is restricted only by the number of conversations globally available. Precludes the use of NUM-CONVERSATION=AUTO in the Broker section of the attribute file.</p> <p><i>n</i> Number of conversations.</p> <p>A value of 0 (zero) is invalid.</p> <p>If NUM-CONVERSATION=AUTO is specified in the Broker section of the attribute file, CONV-LIMIT=UNLIM is not allowed in the service section. A value must be specified or the CONV-LIMIT attribute must be suppressed entirely for the service so that the default (CONV-DEFAULT) becomes active.</p>							
CONV - NONACT	<p><u>5M</u> <i>n</i> <i>nS</i> <i>nM</i> <i>nH</i></p>	R	z	u	w	v	b	
	<p>Non-activity time for connections.</p> <p><i>n</i> Same as <i>nS</i>.</p> <p><i>nS</i> Non-activity time in seconds (max. 2147483647).</p> <p><i>nM</i> Non-activity time in minutes (max. 35791394).</p> <p><i>nH</i> Non-activity time in hours (max. 596523).</p> <p>A value of 0 (zero) is invalid. If a connection is not used for the specified time, that is, a server or a client does not issue a broker request that references the connection in any way, the connection is treated as inactive and the allocated resources are freed.</p>							
CONVERSION	<p>Format: A255</p> <p>(SAGTCHA [, TRACE =<i>n</i>] [, <i>OPTION</i> =<i>s</i>] SAGTRPC [, TRACE =<i>n</i>] [, <i>OPTION</i> =<i>s</i>] <i>name</i> [, TRACE =<i>n</i>] NO)</p>	O	z	u	w	v	b	
	<p>Defines conversion for internationalization. See <i>Internationalization with EntireX</i> and <i>What is the Best Internationalization Approach to use?</i> under <i>Introduction to Internationalization</i> for help on making decisions about the internationalization approach.</p>							

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	<p>SAGTCHA Conversion using ICU Conversion ⁽¹⁾ for ACI-based Programming.</p> <p>SAGTRPC ⁽²⁾ Conversion using ICU Conversion ⁽¹⁾ for RPC-based Components and Reliable RPC.</p> <p>We recommend always using SAGTRPC for RPC data streams. Conversion with Multibyte, Double-byte and other Complex Codepages will always be correct, and Conversion with Single-byte Codepages is also efficient because SAGTRPC detects single-byte codepages automatically. See <i>Conversion Details</i>.</p> <p><name> ⁽²⁾ Name of the SAGTRPC user exit for RPC-based components. See also <i>Configuring SAGTRPC User Exits</i> under <i>Configuring Broker for Internationalization</i> in the platform-specific administration documentation and <i>Writing SAGTRPC User Exits</i> in the platform-specific administration documentation.</p> <p>NO If conversion is not to be used, either omit the CONVERSION attribute or specify CONVERSION=NO, for example for binary payload.</p> <p>Only one internationalization approach can be active at one time for a service. The CONVERSION attribute for internationalization overrides the TRANSLATION attribute when defined for a service. That is, when TRANSLATION and CONVERSION are both defined, TRANSLATION will be ignored.</p> <p>Note:</p> <ol style="list-style-type: none"> See also <i>Configuring ICU Conversion</i> under <i>Configuring Broker for Internationalization</i> in the platform-specific administration documentation. SAGTRPC and SAGTRPC user exit are not supported on z/VSE. <p>TRACE</p> <p>If tracing is switched on, the trace output is written to the broker log file:</p> <p>0 No tracing</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VMSE	BS2000
	<p>1 Trace level STANDARD</p> <p>2 Trace level ADVANCED</p> <p>3 Trace level SUPPORT</p> <p>OPTION</p> <p>See table of possible values under <i>OPTION Values for Conversion</i>.</p>						
DEFERRED	<p><u>NO</u> YES</p> <p>NO Units of work cannot be sent to the service until it is available.</p> <p>YES Units of work can be sent to a service that is not up and registered. The units of work will be processed when the service becomes available.</p>	O	z	u	w	v	b
ENCRYPTION-LEVEL	<p><u>0</u> 1 2</p> <p>Enforce encryption when data is transferred between client and server.</p> <p>0 No encryption is enforced.</p> <p>1 Encryption is enforced between server and broker kernel.</p> <p>2 Encryption is enforced between server and broker kernel, and also between client and broker.</p> <p>See also ENCRYPTION-LEVEL in Broker ACI control block and <i>Encryption under Writing Applications using EntireX Security</i> in the ACI Programming documentation.</p> <p>Note: The per service ENCRYPTION-LEVEL attribute is to be specified only where the broker attribute SECURITY=YES has been specified and only if you are using EntireX Security.</p>	O	z	u	w	v	b
LOAD-BALANCING	<p><u>YES</u> NO</p>	O	z	u	w	v	b

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	<p>YES When servers that offer a particular service are started, new conversations will be assigned to these servers in a round-robin fashion. The first waiting server will get the first new conversation, the second waiting server will get the second new conversation, and so on.</p> <p>NO A new conversation is always assigned to the first server in the queue.</p>						
LONG-BUFFER-LIMIT	<u>UNLIM</u> <i>n</i>	O	z	u	w	v	b
	<p>Allocates a number of long message buffers for the service.</p> <p>UNLIM The number of long message buffers is restricted only by the number of buffers globally available. Precludes the use of NUM-LONG-BUFFER=AUTO in the Broker section of the attribute file.</p> <p><i>n</i> Number of long message buffers.</p> <p>A value of 0 (zero) is invalid. If NUM-LONG-BUFFER=AUTO is specified in the Broker section of the attribute file, LONG-BUFFER-LIMIT=UNLIM is not allowed in the service section. A value must be specified or the LONG-BUFFER-LIMIT attribute must be suppressed entirely for the service so that the default (LONG-BUFFER-DEFAULT) becomes active.</p>						
MAX-MESSAGES-IN-UOW	<u>16</u> <i>n</i>	O	z	u	w	v	b
	<p>Maximum number of messages in a UOW.</p>						
MAX-MESSAGE-LENGTH	<u>2147483647</u> <i>n</i>	O	z	u	w		b
	<p>Maximum message size that can be sent to a service.</p> <p>This is transport-dependent. The default value represents the highest positive number that can be stored in a four-byte integer.</p>						
MAX-MSG	See MAX-MESSAGE-LENGTH.						
MAX-UOW-MESSAGE-LENGTH	See MAX-MESSAGE-LENGTH.						
MAX-UOWS	0 <i>n</i>	O	z	u	w	v	b
	<p>0 The service does not accept units of work, i.e. it processes only messages that are not part of a UOW. Using zero prevents the sending of UOWs to services that are not intended to process them.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<p><i>n</i> Maximum number of UOWs that can be active concurrently for the service. If you do not provide a MAX-UOWS value for the service, it defaults to the MAX-UOWS setting for the broker. If you provide a value that exceeds that of the broker, the service MAX-UOWS is set to the broker's MAX-UOWS value and a warning message is issued.</p> <p>Specify MAX-UOWS=0 for Natural RPC Servers. This restriction will be removed with a later release.</p>						
MIN-UOW-CONVERSATIONS-IN-MEMORY	256 <i>n</i>	O	z	u	w	v	b
	<p>Defines the minimum number of UOW conversations (STORE=BROKER, created by a client and finished with an EOC without being accepted by a server) kept in memory to improve the performance for servers receiving new UOW conversations without waiting for data to be swapped in from PSTORE. See also <i>Swapping out New Units of Work</i> in the general administration documentation.</p> <p>256 The default value should be used if producer (client) and consumer (server) of UOW conversations are both active at the same time regardless of the speed producing or consuming UOW conversations. It guarantees a reasonable balance between memory being used and swap-out/swap-in activities.</p> <p><i>n</i> Minimum number of UOW conversations kept in memory. The value <i>n</i> is equal to or greater than 256.</p> <p>Note: If broker-specific attribute SWAP-OUT-NEW-UOWS is set to "NO", MIN-UOW-CONVERSATIONS-IN-MEMORY has no effect.</p>						
MUOW	See MAX-UOWS.						
NOTIFY-EOC	NO YES	O	z	u	w	v	b
	<p>Specifies whether timed-out conversations are to be stored or discarded.</p> <p>NO Discard the EOC notifications if the server is not ready to receive.</p> <p>YES Store the EOC notifications if the server is not ready to receive and then notify the server if possible.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VMSE	BS2000
	<p>If a server is not ready to receive an EOC notification, it can be stored or discarded. If it is stored, the server is notified, if possible, when it is ready to receive.</p> <p>Caution: The behavior activated by this parameter can be relied upon only during a single lifetime of the broker kernel. Specifically, conversations containing units of work, whose lifetime can span multiple broker kernel sessions, cannot be assumed to show this behavior, even with NOTIFY - EOC=YES.</p>						
NUM-UOW	Alias for MAX-UOWS.						
SERVER	A32 (case-sensitive)	R	z	u	w	v	b
	<p>Part of the name that identifies the service together with the CLASS and SERVICE attributes.</p> <p>CLASS must be specified first, followed immediately by SERVER and SERVICE.</p> <p>Valid characters for server name are letters a-z, A-Z, numbers 0-9, hyphen and underscore. Do not use dollar, percent, period or comma.</p>						
SERVER-DEFAULT	<i>n</i> UNLIM	O	z	u	w	v	b
	<p>Default number of servers that are allowed for every service.</p> <p><i>n</i> Number of servers.</p> <p>UNLIM The number of servers is restricted only by the number of servers globally available. Precludes the use of NUM-SERVER=AUTO.</p> <p>A value of 0 (zero) is invalid.</p> <p>This value can be overridden by specifying a SERVER-LIMIT for the service.</p>						
SERVER-LIMIT	<i>n</i> UNLIM	O	z	u	w	v	b
	<p>Allows a number of servers especially for this service.</p> <p><i>n</i> Number of servers.</p> <p>UNLIM The number of servers is restricted only by the number of servers globally available. Precludes the use of NUM-SERVER=AUTO in the Broker section of the attribute file.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSSE	BS2000
	<p>A value of 0 (zero) is invalid.</p> <p>If NUM-SERVER=AUTO is specified in the Broker section of the attribute file, SERVER-LIMIT=UNLIM is not allowed in the service section. A value must be specified or the SERVER-LIMIT attribute must be suppressed entirely for the service so that the default (SERVER-DEFAULT) becomes active.</p>						
SERVER-NONACT	<u>5M</u> <i>n</i> <i>nS</i> <i>nM</i> <i>nH</i>	R	z	u	w	v	b
	<p>Non-activity time for servers. A server that does not issue a broker request within the specified time limit is treated as inactive and all resources for the server are freed.</p> <p><i>n</i> Same as <i>nS</i>. <i>nS</i> Non-activity time in seconds (max. 2147483647). <i>nM</i> Non-activity time in minutes (max. 35791394). <i>nH</i> Non-activity time in hours (max. 596523).</p> <p>If a server registers multiple services, the highest value of all the services registered is taken as non-activity time for the server.</p>						
SERVICE	A32 (case-sensitive)	R	z	u	w	v	b
	<p>Part of the name that identifies the service together with the CLASS and SERVER attributes.</p> <p>CLASS must be specified first, followed immediately by SERVER and SERVICE.</p> <p>The SERVICE attribute names "EXTRACTOR" and "DEPLOYMENT" are reserved for Software AG internal use and should not be used in customer-written applications. Valid characters for service name are letters a-z, A-Z, numbers 0-9, hyphen and underscore. Do not use dollar, percent, period or comma. See also the restriction for CLASS attribute names.</p>						
SHORT-BUFFER-LIMIT	<u>UNLIM</u> <i>n</i>	O	z	u	w	v	b
	<p>Allocates a number of short message buffers for the service.</p> <p>UNLIM The number of short message buffers is restricted only by the number of buffers globally available. Precludes the use of NUM-SHORT-BUFFER=AUTO in the Broker section of the attribute file.</p>						

Attribute	Values	Opt/ Req	Operating System							
			z/OS	UNIX	Windows	z/VSE	BS2000			
	<p><i>n</i> Number of short message buffers.</p> <p>If NUM-SHORT-BUFFER=AUTO is specified in the Broker section of the attribute file, SHORT-BUFFER-LIMIT=UNLIM is not allowed in the service section. A value must be specified or the SHORT-BUFFER-LIMIT attribute must be suppressed entirely for the service so that the default (SHORT-BUFFER-DEFAULT) becomes active.</p>									
STORE	OFF BROKER	O	z	u	w	v	b	<p>Sets the default STORE attribute for all units of work sent to the service.</p> <p>OFF Units of work are not persistent. BROKER Units of work are persistent.</p> <p>This attribute can be overridden by the STORE field in the Broker ACI control block.</p>		
TRANSLATION	Format: A255 SAGTCHA NO <name>	O	z	u	w	v	b	<p>Activates <i>translation</i> or <i>translation user exit</i> for internationalization (see <i>Translation User Exit</i> under <i>Introduction to Internationalization</i>). For help on deciding the right internationalization approach for your environment, see <i>What is the Best Internationalization Approach to use?</i> under <i>Introduction to Internationalization</i></p> <p>SAGTCHA Conversion routine SAGTCHA for <i>ACI-based Programming, RPC-based Components and Reliable RPC</i>.</p> <p>NO If translation is not to be used - e.g., for binary payload (broker messages) - either omit the TRANSLATION attribute or specify TRANSLATION=NO.</p> <p><name> Name of Translation User Exit. See also <i>Configuring Translation User Exits</i> under <i>Configuring Broker for Internationalization</i> in the platform-specific administration documentation or <i>Writing Translation User Exits</i> under <i>Configuring Broker for Internationalization</i> in the platform-specific administration documentation.</p>		

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VMSE	BS2000
	The CONVERSION attribute for internationalization overrides the TRANSLATION attribute when defined for a service; that is, when TRANSLATION and CONVERSION are both defined, TRANSLATION will be ignored.						
UMSG	Alias for MAX-MESSAGES-IN-UOW.						
UOW-MSG	Alias for MAX-MESSAGES-IN-UOW.						
UWSTAT-LIFETIME	<u>no value</u> <i>n</i> [S] <i>n</i> M <i>n</i> H <i>n</i> D	O	z	u	w	v	b
	<p>The value to be added to the UWTIME (lifetime of associated UOW). If a value is entered, it must be 1 or greater; a value of 0 will result in an error. If no value is entered, the lifetime of the UOW <i>status</i> information will be the same as the lifetime of the UOW itself.</p> <p><i>n</i>S Number of seconds the UOW status exists longer than the UOW itself (max. 2147483647). <i>n</i>M Number of minutes (max. 35791394). <i>n</i>H Number of hours (max. 596523). <i>n</i>D Number of days (max. 24855).</p> <p>The lifetime determines how much additional time the UOW status is retained in the persistent store and is calculated from the time at which the associated UOW enters any of the following statuses: "PROCESSED", "TIMEOUT", "BACKEDOUT", "CANCELLED", "DISCARDED". The additional lifetime of the UOW status is calculated only when broker is executing. Value in UWSTAT-LIFETIME supersedes the value (if specified) in attribute UWSTATP.</p> <p>Note: If no unit is specified, the default unit is seconds. The unit does not have to be identical to the unit specified for UWTIME.</p>						
UWSTATP	<u>0</u> <i>n</i>	O	z	u	w	v	b
	<p>Contains a multiplier used to compute the lifetime of a persistent status for the service. The UWSTATP value is multiplied by the UWTIME value (the lifetime of the associated UOW) to determine the length of time the status will be retained in the persistent store.</p> <p>0 The status is not persistent. 1 - 254 Multiplied by the value of UWTIME to determine how long a persistent status will be retained.</p>						

Attribute	Values	Opt/ Req	Operating System					
			z/OS	UNIX	Windows	zVSE	BS2000	
	Note: This attribute has not been supported since EntireX version 7.3. Use UWSTAT - LIFETIME instead.							
UWTIME	<u>1D</u> nS nM nH nD	O	z	u	w	v	b	
	<p>Defines the default lifetime for units of work for the service.</p> <p>nS Number of seconds the UOW can exist (max. 2147483647). nM Number of minutes the UOW can exist (max. 35791394). nH Number of hours the UOW can exist (max. 596523). nD Number of days the UOW can exist (max. 24855).</p> <p>If the unit of work (UOW) is inactive, that is, not processed within the time limit, it is deleted and given a status of TIMEOUT. This attribute can be overridden by the UWTIME field in the Broker ACI control block.</p>							

Wildcard Service Definition

The special names of `CLASS = *`, `SERVER = *` and `SERVICE = *` are allowed in the service-specific section of the broker attribute file. These are known as "wildcard" service definitions. If this name is present in the attribute file, any service that registers with the broker and does not have its own entry in the attribute file will inherit the attributes that apply to the first wildcard service definition found.

For example, a server that registers with `CLASS=AClass`, `SERVER=AServer` and `SERVICE=AService` can inherit attributes from any of the following entries in the attribute file (this list is not necessarily complete):

```
CLASS = *, SERVER = ASERVER, SERVICE = ASERVICE
CLASS = ACLASS, SERVER = *, SERVICE = *
CLASS = *, SERVER = *, SERVICE = *
```

Of course, if there is a set of attributes that are specifically defined for `CLASS=AClass`, `SERVER=AServer`, `SERVICE=AService`, then all of the wildcard service definitions will be ignored in favor of the exact matching definition.

Service Update Modes

EntireX has two modes for handling service-specific attributes. See broker-specific attribute SERVICE-UPDATES.

- In **service update mode** (SERVICE-UPDATES=YES), the service configuration sections of the attribute file are read whenever the first replica of a particular service registers.
- In **non-update mode** (SERVICE-UPDATES=NO), the attribute file is not reread. All attributes are read during startup and the broker does not honor any changes in the attribute file. This mode is useful if
 - there is a high frequency of REGISTER operations, or
 - the attribute file is rather large and results in a high I/O rate for the broker.

The disadvantage to using non-update mode is that if specific attributes are modified, the broker must be restarted to effect the changes. Generally, this mode should be used only if the I/O rate of the broker is considerably high, and if the environment seldom changes.

OPTION Values for Conversion

The different option values allow you to either handle character conversion deficiencies as errors, or to ignore them:

1. Do not ignore any character conversion errors and force an error always (value STOP). This is the default behavior.
2. Ignore if characters can not be converted into the receiver's codepage, but force an error if sender characters do not match the sender's codepage (value SUBSTITUTE-NONCONV).
3. Ignore any character conversion errors (values SUBSTITUTE and BLANKOUT).

The situations 1 and 2 above are reported to the broker log file if TRACE option for CONVERSION is set to level 1.

Value	Description	Options Supported for		Report Situation in Broker Log File if TRACE Option for CONVERSION is set to 1	
		SAGTCHA	SAGTRPC	Bad Input Characters (Sender's Codepage)	Non-convertible Characters (Receiver's Codepage)
SUBSTITUTE	Substitutes both non-convertible characters (receiver's codepage) and bad input characters (sender's codepage) with a	yes	yes	No message.	No message

Value	Description	Options Supported for		Report Situation in Broker Log File if TRACE Option for CONVERSION is set to 1	
		SAGTCHA	SAGTRPC	Bad Input Characters (Sender's Codepage)	Non-convertible Characters (Receiver's Codepage)
	codepage-dependent default replacement character.				
SUBSTITUTE - NONCONV	If a corresponding code point is not available in the receiver's codepage, the character cannot be converted and is substituted with a codepage-dependent default replacement character. Bad input characters in sender's codepage are not substituted and result in an error.	yes	yes	Write detailed conversion error message.	No message.
BLANKOUT	Substitutes non-convertible characters with a codepage-dependent default replacement; blanks out the complete RPC IDL field containing one or more bad input characters.	no	yes	No message.	No message.
STOP	Signals an error on detecting a non-convertible or bad input character. This is the default behavior if no option is specified.	yes	yes	Write detailed conversion error message.	Write detailed conversion error message.

Topic-specific Attributes

The topic-specific attribute section begins with the keyword `DEFAULTS=TOPIC` as shown in the sample attribute file. It contains attributes that apply to the publish and subscribe communication model.

Attribute	Values	Opt/Req	Operating System				
			z/OS	UNIX	Windows	z/VSSE	BS2000
ALLOW-DURABLE	<u>YES</u> NO	O	z	u	w	v	b
<p>Determines whether a subscriber is allowed to perform a durable subscription to a topic.</p> <p>YES Subscriber may perform durable subscription. NO Durable subscription not allowed.</p> <p>If users are allowed to durably subscribe to any topic, you must specify a value for the <code>SUBSCRIBER-STORE</code> parameter.</p>							
ALLOW-USER-SUBSCRIBE	<u>YES</u> NO	O	z	u	w	v	b
<p>Determines if it is possible for a user to subscribe to a topic directly (YES) or only by Administrator.</p> <p>YES Users are allowed to subscribe to the topic. NO Users must be subscribed by the Administrator through CIS. See <i>Broker Command and Information Services</i>. The subscribe request of users is rejected.</p>							
AUTO-COMMIT-FOR-SUBSCRIBER	<u>NO</u> YES	O	z	u	w	v	b
<p>NO No COMMIT performed. YES An implicit COMMIT is performed by broker when the subscriber receives a publication, that is, the subscriber does not need the <code>CONTROL_PUBLICATION</code> option COMMIT after receiving each publication.</p> <p>Caution: You may lose your last message.</p>							
CONVERSION	Format: A255 (SAGTCHA [TRACE =n]	O	z	u	w	v	b

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	[, <i>OPTION</i> =s])						
<p>Defines conversion for internationalization. See <i>Internationalization with EntireX</i>. For help on making decisions about the internationalization approach, see <i>What is the Best Internationalization Approach to use?</i> under <i>Introduction to Internationalization</i></p> <p>SAGTCHA Conversion using ICU Conversion for <i>ACI-based Programming</i>. For more information see <i>Conversion Details</i>.</p> <p>See also <i>Configuring ICU Conversion</i> under <i>Configuring Broker for Internationalization</i> in the platform-specific administration documentation.</p> <p>NO If conversion is not to be used, either omit the CONVERSION attribute or specify CONVERSION=NO, for example for binary payload.</p> <p>Only one internationalization approach can be active at one time for a topic. The CONVERSION attribute for internationalization overrides the TRANSLATION attribute when defined for a topic, that is, when TRANSLATION and CONVERSION are both defined, TRANSLATION will be ignored.</p> <p>TRACE</p> <p>If tracing is switched on, the trace output is written to the broker log file:</p> <p>0 No tracing</p> <p>1 Trace level STANDARD This level is an "on-error" trace. It provides information on conversion errors only. Please note that if <i>OPTION Values for Conversion</i> are set, errors are ignored.</p> <p>2 Trace level ADVANCED Tracing of incoming, outgoing parameters and the payload.</p> <p>3 Trace level SUPPORT This trace level is for support diagnostics and should only be switched on when requested by Software AG support.</p> <p>OPTION</p>							

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSSE	BS2000
	See <i>OPTION Values for Conversion</i> under <i>Service-specific Attributes</i> above.						
LONG-BUFFER-LIMIT	UNLIM <i>n</i>	O	z	u	w	v	b
	<p>Allocates a number of long message buffers for the topic.</p> <p>UNLIM The number of long message buffers is restricted only by the number of buffers globally available. Excludes the use of NUM-LONG-BUFFER=AUTO in the Broker section of the attribute file.</p> <p><i>n</i> Number of long message buffers.</p> <p>A value of 0 (zero) is invalid. If NUM-LONG-BUFFER=AUTO is specified in the Broker section of the attribute file, LONG-BUFFER-LIMIT=UNLIM is not allowed in the topic section. A value must be specified or the LONG-BUFFER-LIMIT attribute must be suppressed entirely for the topic so that the default (LONG-BUFFER-DEFAULT) becomes active.</p>						
MAX-MESSAGES-IN-PUBLICATION	16 <i>n</i>	O	z	u	w	v	b
	Maximum number of messages in a publication.						
MAX-PUBLICATION-MESSAGE-LENGTH	31647 <i>n</i>	O	z	u	w	v	b
	Maximum size of a message in a publication. The actual publication size is transport-dependent.						
PUBLICATION-LIFETIME	<i>n</i> <i>nS</i> <i>nM</i> <i>nH</i> <i>nD</i> <i>nY</i>	O	z	u	w	v	b
	<p>Lifetime of a publication in absolute time units. Publications are retained by broker until they are either received by all subscribers or the publication lifetime has expired.</p> <p><i>n</i> Same as <i>nS</i>.</p> <p><i>nS</i> Publication lifetime in seconds (max. 2147483647).</p> <p><i>nM</i> Publication lifetime in minutes (max. 35791394).</p> <p><i>nH</i> Publication lifetime in hours (max. 596523).</p> <p><i>nD</i> Publication lifetime in days (max. 24855).</p> <p><i>nY</i> Publication lifetime in years (max. 68).</p> <p>The publication lifetime is calculated even for periods of time when broker is stopped.</p>						
PUBLICATION-LIMIT	<i>n</i> UNLIM	O	z	u	w	v	b

Attribute	Values	Opt/ Req	Operating System							
			zOS	UNIX	Windows	zVSE	BS2000			
	<p>There is no default. Maximum number of publications possible for this topic. If specified, this overrides the publication default value, which is a general maximum value per topic. If neither parameter is specified, the total number of publications for the topic is limited only by NUM-PUBLICATION.</p> <p><i>n</i> Number of publications.</p> <p>UNLIM The number of publications is restricted only by the number of publications globally available. Excludes the use of NUM-PUBLICATION=AUTO in the Broker section of the attribute file.</p> <p>A value of 0 (zero) is invalid. If PUBLICATION-LIMIT=AUTO is specified in the Broker section of the attribute file, PUBLICATION-LIMIT=UNLIM is not allowed in the topic section. A value must be specified, or the PUBLICATION-LIMIT attribute must be suppressed entirely for the topic so that the default (PUBLICATION-DEFAULT) becomes active.</p>									
PUBLISHER-NONACT	<p><u>5M</u> <i>n</i> <i>nS</i> <i>nM</i> <i>nH</i> <i>nD</i> <i>nY</i></p>	O	z	u	w	v	b			
	<p>Non-activity of the publisher, after which an auto-logoff is performed and the publisher's resources are freed.</p> <p><i>n</i> Same as <i>nS</i>.</p> <p><i>nS</i> Non-activity time in seconds (max. 2147483647).</p> <p><i>nM</i> Non-activity time in minutes (max. 35791394).</p> <p><i>nH</i> Non-activity time in hours (max. 596523).</p> <p><i>nD</i> Non-activity time in days (max. 24855).</p> <p><i>nY</i> Non-activity time in years (max. 68).</p> <p>If not specified, defaults to 5 minutes. This is the time after which the publisher's internal memory structures will be cleaned up and a subsequent logon is required.</p>									
SHORT-BUFFER-LIMIT	<u>UNLIM</u> <i>n</i>	O	z	u	w	v	b			
	<p>Allocates a number of short message buffers for the topic.</p> <p>UNLIM The number of short message buffers is restricted only by the number of buffers globally available. Excludes the</p>									

Attribute	Values	Opt/ Req	Operating System				
			zOS	UNIX	Windows	zVSE	BS2000
	<p>use of NUM- LONG- BUFFER=AUTO in the Broker section of the attribute file.</p> <p><i>n</i> Number of short message buffers.</p> <p>A value of 0 (zero) is invalid. If NUM- SHORT- BUFFER=AUTO is specified in the Broker section of the attribute file, SHORT- BUFFER- LIMIT=UNLIM is not allowed in the topics section. A value must be specified, or the SHORT- BUFFER- LIMIT attribute must be suppressed entirely for the topic so that the default (SHORT- BUFFER- DEFAULT) becomes active.</p>						
SSTORE SSTORE- TYPE	<p>These parameters are obsolete. The subscriber store in a secondary store is no longer supported. We recommend you use the primary persistent store (PSTORE) to store your subscriber data. For this, set broker-specific parameter SUBSCRIBER- STORE=PSTORE.</p>						
SUBSCRIBER- LIMIT	<i>n</i> UNLIM	O	z	u	w	v	b
	<p>There is no default. Maximum number of subscriptions possible for this topic. If specified, this overrides the subscriber default value, which is a general maximum value per topic. If neither parameter is specified, the total number of subscribers for the topic is limited only by NUM- SUBSCRIBER.</p> <p><i>n</i> Number of subscribers.</p> <p>UNLIM The number of subscribers is restricted only by the number of subscribers globally available. Excludes the use of NUM- SUBSCRIBER=AUTO in the Broker section of the attribute file.</p> <p>A value of 0 (zero) is invalid. If NUM- SUBSCRIBER=AUTO is specified in the Broker section of the attribute file, SUBSCRIBER- LIMIT=UNLIM is not allowed in the topic section. A value must be specified, or the SUBSCRIBER- LIMIT attribute must be suppressed entirely for the topic so that the default (SUBSCRIBER- DEFAULT) becomes active.</p>						
SUBSCRIBER- NONACT	<u>5M</u> <i>n</i> <i>nS</i> <i>nM</i> <i>nH</i> <i>nD</i> <i>nY</i>	O	z	u	w	v	b
	<p>Non-activity of the subscriber after which an auto-logoff is performed and the publisher's resources are freed.</p> <p><i>n</i> Same as <i>nS</i>.</p>						

Attribute	Values	Opt/ Req	Operating System							
			z/OS	UNIX	Windows	z/VSE	BS2000			
	<p><i>nS</i> Non-activity time in seconds (max. 2147483647). <i>nM</i> Non-activity time in minutes (max. 35791394). <i>nH</i> Non-activity time in hours (max. 596523). <i>nD</i> Non-activity time in days (max. 24855). <i>nY</i> Non-activity time in years (max. 68).</p> <p>In the case of a non-durable subscriber, the user's subscription is also cancelled. In the case of a durable subscriber, the user's subscription is persisted, and it is not necessary for the user to issue any subsequent SUBSCRIBE commands. The subscription of a durable subscriber is also persisted even while broker is stopped.</p> <p>If not specified, defaults to 5 minutes. This is the time after which the subscriber's internal memory structures will be cleaned up and a subsequent logon is required.</p>									
SUBSCRIPTION-EXPIRATION	<p><u>NEVER</u> <i>n</i> <i>nS</i> <i>nM</i> <i>nH</i> <i>nD</i> <i>nY</i></p>	O	z	u	w	v	b			
	<p>Lifetime of a user's subscription in absolute time units. Subscriptions are retained by broker until either the user issues an UNSUBSCRIBE command or the subscription lifetime has expired.</p> <p>NEVER Subscriber will never be purged from PSTORE.</p> <p><i>n</i> Same as <i>nS</i>. <i>nS</i> Expiration time in seconds (max. 2147483647). <i>nM</i> Expiration time in minutes (max. 35791394). <i>nH</i> Expiration time in hours (max. 596523). <i>nD</i> Expiration time in days (max. 24855). <i>nY</i> Expiration time in years (max. 68).</p> <p>Durable subscriptions remain effective even if the user performs the LOGOFF command or broker is stopped. The subscription lifetime is calculated also for periods of time when broker is stopped.</p> <p>SUBSCRIPTION-EXPIRATION is the time after which the subscription expires. In the case of durable subscription, the subscription is removed from the PSTORE. Broker removes expired subscriptions only when the user is not currently active, for example</p>									

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VMSE	BS2000
	<p>when the user has issued a LOGOFF command or after the SUBSCRIBER-NONACT has passed if no LOGOFF is issued.</p> <p>If SUBSCRIBER-NONACT is specified greater than SUBSCRIPTION-EXPIRATION, broker adjusts SUBSCRIPTION-EXPIRATION to the value of SUBSCRIBER-NONACT.</p>						
TOPIC	A96 (case-sensitive)	R	z	u	w	v	b
	<p>Name of the topic for publish and subscribe processing. Valid characters for topic name are letters a-z, A-Z, numbers 0-9, hyphen and underscore. Do not use dollar, percent, period or comma.</p>						
TRANSLATION	Format: A255 SAGTCHA NO <name>	O	z	u	w	v	b
	<p>Activates <i>translation</i> or <i>translation user exit</i> for internationalization (see <i>Translation User Exit</i> under <i>Introduction to Internationalization</i>). See also <i>What is the Best Internationalization Approach to use?</i> under <i>Introduction to Internationalization</i></p> <p>SAGTCHA Conversion routine SAGTCHA for ACI-based programming, RPC-based components and for <i>Reliable RPC</i>.</p> <p>NO If translation is not to be used, e.g. for binary payload (broker messages), either omit the TRANSLATION attribute or specify TRANSLATION=NO.</p> <p><name> Name of Translation User Exit. See also <i>Configuring SAGTRPC User Exits</i> under <i>Configuring Broker for Internationalization</i> in the platform-specific administration documentation and <i>Writing SAGTRPC User Exits</i> in the platform-specific administration documentation.</p> <p>The CONVERSION attribute for internationalization overrides the TRANSLATION attribute when defined for a service, i.e. when TRANSLATION and CONVERSION are both defined, TRANSLATION will be ignored.</p>						

Codepage-specific Attributes

The codepage-specific attribute section begins with the keyword `DEFAULTS=CODEPAGE` as shown in the sample attribute file. You can use the attributes in this section to customize the broker's locale string defaults and customize the mapping of locale strings to codepages for the internationalization approaches ICU conversion and SAGTRPC user exit. These attributes do not apply to other approaches. See *Internationalization with EntireX* for more information.

Attribute	Values	Opt/Req	Operating System				
			zOS	UNIX	Windows	z/OS	BS2000
DEFAULT_ASCII	Any ICU converter name or alias. See also Additional Notes below.	O	z	u	w	v	b
<p>Customize the broker's locale string defaults by assigning the default codepage for EntireX components (client or server, publisher or subscriber). See <i>Broker's Locale String Defaults</i> under <i>Locale String Mapping</i> in the internationalization documentation. This value is used instead of the broker's locale string defaults if</p> <ul style="list-style-type: none"> ■ the calling component does not send a locale string itself, and ■ the calling component is running on an ASCII platform (UNIX, Windows, etc.), and ■ one of the internationalization approaches ICU conversion or SAGTRPC user exit is used. See <i>ICU Conversion</i> under <i>Introduction to Internationalization</i> and <i>SAGTRPC User Exit</i> under <i>Introduction to Internationalization</i>. <p>Example:</p> <pre> DEFAULTS=CODEPAGE /* Broker Locale String Defaults */ DEFAULT_ASCII=windows-950 </pre> <p>For more examples, see <i>Configuring Broker's Locale String Defaults</i> under <i>Locale String Mapping</i> in the internationalization documentation and also Additional Notes below.</p>							
DEFAULT_EBCDIC_IBM	Any ICU converter	O	z	u	w	v	b

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	name or alias						
	<p>Customize the broker's locale string defaults by assigning the default codepage for EntireX components (client or server, publisher or subscriber). See <i>Broker's Locale String Defaults</i> under <i>Locale String Mapping</i> in the internationalization documentation. This value is used instead of the broker's locale string defaults if</p> <ul style="list-style-type: none"> ■ the calling component does not send a locale string itself and ■ the calling component is running on an IBM mainframe platform (z/OS, z/VSE etc.) and ■ one of the internationalization approaches ICU conversion or SAGTRPC user exit is used. <p>Example:</p> <pre>DEFAULT=CODEPAGE DEFAULT_EBCDIC_IBM=ibm-937</pre> <p>For more examples, see <i>Configuring Broker's Locale String Defaults</i> under <i>Locale String Mapping</i> in the internationalization documentation and also Additional Notes below.</p>						
DEFAULT_EBCDIC_SNI	Any ICU converter name or alias	O	z	u	w	v	b
	<p>Customize the broker's locale string defaults by assigning the default codepage for EntireX components (client or server, publisher or subscriber). See <i>Broker's Locale String Defaults</i> under <i>Locale String Mapping</i> in the internationalization documentation. This value is used instead of the locale string defaults if</p> <ul style="list-style-type: none"> ■ the calling component does not send a locale string itself, and ■ the calling component is running on a Fujitsu EBCDIC mainframe platform (BS2000/OSD), and ■ one of the internationalization approaches ICU conversion or SAGTRPC user exit is used. <p>Example:</p>						

Attribute	Values	Opt/Req	Operating System				
			z/OS	UNIX	Windows	z/SE	BS2000
	<pre>DEFAULT=CODEPAGE DEFAULT_EBCDIC_SNI= bs2000-edf03drv</pre> <p>For more examples, see <i>Configuring Broker's Locale String Defaults</i> under <i>Locale String Mapping</i> in the internationalization documentation and also Additional Notes below.</p>						
locale-string	Any ICU converter name or alias. See also Additional Notes below.	O	z	u	w	v	
<p>Customize the mapping of locale strings to codepages and bypass the broker's locale string processing mechanism. See <i>Broker's Locale String Processing</i> under <i>Locale String Mapping</i> in the internationalization documentation. This is useful:</p> <ul style="list-style-type: none"> ■ if the broker's locale string processing fails - i.e. leads to no codepage or to the wrong codepage - you can explicitly assign the codepage which meets your requirements. ■ if you want to install user-written ICU converters (codepages) into the broker, see <i>Building and Installing ICU Custom Converters</i> in the platform-specific administration documentation. <p>The attribute (locale string) is the locale string sent by your EntireX component (client or server, publisher or subscriber) and the value is the codepage that you want to use in place of that locale string. In the first line of the example below, the client or server application sends ASCII as a locale string; the broker maps this to the codepage ISO 8859_1. In the same way EUC_JP_LINUX is mapped to ibm-33722_P12A-1999. All other locale strings are mapped by the broker's mapping mechanism, see <i>Broker's Built-in Locale String Mapping</i> under <i>Locale String Mapping</i> in the internationalization documentation. Example:</p> <pre>DEFAULTS=CODEPAGE /* Broker Locale String Codepage Assignments */ ASCII=ISO8859 EUC_JP_LINUX=ibm-33722_P12A-1999 /* Customer-written ICU converters */ CP1140=myebcdic CP0819=myascii</pre>							

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	For more examples, see <i>Bypassing Broker's Built-in Locale String Mapping</i> under <i>Locale String Mapping</i> in the internationalization documentation and also Additional Notes below.						

Additional Notes

- Locale string matching is case insensitive when bypassing the broker's built-in mechanism, that is, when the broker examines the codepages section in the attribute file.
- If ICU is used for the internationalization approach and if the style is not known by ICU, e.g. `ECSnnnn`, `<ll>_<cc>` etc., the name will be mapped to a suitable ICU alias. For more details on the mapping mechanism, see *Broker's Built-in Locale String Mapping* under *Locale String Mapping* in the internationalization documentation. For more details on ICU and ICU converter name standards, see *ICU Resources* under *Introduction to Internationalization*.
- If SAGTRPC user exit is used for the internationalization approach, we recommend assigning the codepage in the form `CP<nnnnn>`. To determine the number given to SAGTRPC user exit, see *Broker's Built-in Locale String Mapping* under *Locale String Mapping* in the internationalization documentation.
- See `CONVERSION` and `CONVERSION` attribute `CONVERSION` on this page for the internationalization approach in use.

Security-specific Attributes

The security-specific attribute section begins with the keyword `DEFAULTS=SECURITY` as shown in the sample attribute file. This section applies only if broker-specific attribute `SECURITY=YES` is specified.

Attribute	Values	Opt/Req	Operating System				
			zOS	UNIX	Windows	zVSE	BS2000
ACCESS-SECURITY-SERVER	NO YES	O					b
<p>Determines where authentication is checked.</p> <p>NO Authentication is checked in the broker tasks. This requires broker to be running under TSOS in order to execute privileged security checks.</p> <p>YES Authentication is checked in the EntireX Broker Security Server for BS2000/OSD. This does not require broker to be running under TSOS. See <i>EntireX Broker Security Server for BS2000/OSD</i> in the BS2000/OSD administration documentation.</p>							
APPLICATION-NAME	A8	O	z				
<p>Specifies the name of the application to be checked if <code>FACILITY-CHECK=YES</code> is defined. In RACF, for example, an application "BROKER" with read permission for user "DOE" is defined with following commands:</p> <pre>RDEFINE APPL BROKER UACC(NONE) PERMIT BROKER CLASS(APPL) ID(DOE) ACCESS(READ) SETROPTS CLASSACT(APPL)</pre> <p>See attribute <code>FACILITY-CHECK</code> for more information.</p>							
AUTHENTICATION-TYPE	OS <i>ldapUrl</i> <i>iafUrl</i>	O	z	u	w		b
<p>OS Authentication is performed against the local operating system. Default if <code>SECURITY=YES</code> is specified and section <code>DEFAULTS=SECURITY</code> is omitted from the attribute file.</p> <p><i>ldapUrl</i> Authentication is performed against the LDAP repository specified under <i>ldapUrl</i>. Not supported under BS2000/OSD.</p> <ul style="list-style-type: none"> ■ For TCP, specify repository URL: 							

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<pre>AUTHENTICATION-TYPE="ldap://HostName[:PortNumber]"</pre> <p>■ For SSL or TLS:</p> <pre>AUTHENTICATION-TYPE="ldaps://HostName[:PortNumber]"</pre> <p>If no port number is specified, the default is the standard LDAP port number 389 for TCP transport. Examples for TCP and SSL (or TLS):</p> <pre>AUTHENTICATION-TYPE="ldap://myhost.mydomain.com" AUTHENTICATION-TYPE="ldaps://myhost.mydomain.com:636"</pre> <p><i>iafUrl</i> Authentication is performed using Software AG's Integrated Authentication Framework against the IAF service specified under <i>iafUrl</i>. Not supported under BS2000/OSD.</p> <p>The URL of the IAF service is specified using</p> <pre>AUTHENTICATION-TYPE="iaf://HostName[:PortNumber]?SSLParameters"</pre> <p>If no port number is specified, the default is port number 1958. SSL or TLS parameters are specified in the same format as for the ACI function SETSSLPARAM. Example: AUTHENTICATION-TYPE="iaf://myhost.mydomain.com:10000?verify_server=no&trust_store=/opt/softwareag/EntireX/etc/ExxCACert.pem"</p> <p>On z/OS, the URL of an IAF service running on the same host may be specified</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	<p>AUTHENTICATION-TYPE= "iaf.ipc://IAFServiceID[:SVCNumber]"</p> <p>Example:</p> <p>AUTHENTICATION-TYPE= "iaf.ipc://IAF075:SVC245"</p> <p>Under z/OS, IAF is currently not capable of performing authorization calls against RACF resource definitions. As the default SECURITY-LEVEL sets both authentication and authorization, it must be explicitly restricted to SECURITY-LEVEL=AUTHENTICATION.</p>						
AUTHORIZATIONDEFAULT	YES NO	O		u	w		
	<p>Determines whether access is granted to a specified service if the specified could not be found listed in the repository of authorization rules.</p> <p>YES Grant access. NO Deny access.</p> <p>Applies only when using EntireX Security under UNIX and Windows. Authorization rules can be stored within a repository. When an authorization call occurs, EntireX Security uses the values of this parameter and AUTHORIZATIONDEFAULT to perform an access check for a particular broker instance against an (authenticated) user ID and list of rules.</p> <p>See also <i>Administering Authorization Rules using System Management Hub</i> in the UNIX and Windows administration documentation.</p>						
AUTHORIZATIONRULE	A32	O		u	w		
	<p>List of authorization rules. Multiple sets of rules can be defined, each set is limited to 32 chars. The maximum number of AUTHORIZATIONRULE entries in the attribute file is 16.</p> <p>Applies only when using EntireX Security under UNIX or Windows. Authorization rules can be stored within a repository. When an authorization call occurs, EntireX Security uses the values of this parameter and AUTHORIZATIONDEFAULT to perform an access check for a particular broker instance against an (authenticated) user ID and list of rules.</p> <p>See also <i>Administering Authorization Rules using System Management Hub</i> in the UNIX and Windows administration documentation.</p>						
CHECK-IP-ADDRESS	YES <u>NO</u>	O	z				
	<p>Determines whether the TCP/IP address of the caller is subject to a resource check.</p>						
ERRTXT-MODULE	<u>NA2MSG0</u> NA2MSG1	O	z				

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	NA2MSG2 <i>ModuleName</i>						
	Specifies the name of the security error text module. Default is "NA2MSG0", English messages. For instructions on how to customize messages, see <i>Build Language-specific Messages (Optional)</i> under <i>Installing EntireX Security under z/OS under z/OS</i> in the z/OS installation documentation.						
FACILITY-CHECK	<u>NO</u> YES	O	z				
	It is possible to check whether a particular user is at all allowed to use an application before performing a password check. The advantage of this additional check is that when the user is not allowed to use this application, the broker returns error 00080013 and does not try to authenticate the user. Failing an authentication check may lead to the user's password being revoked; this situation is avoided if the facility check is performed first. See attribute APPLICATION-NAME for further details.						
	Note: This facility check is an additional call to the security subsystem and is executed before each authentication call.						
IGNORE-STOKEN	<u>NO</u> YES	O	z	u	w		b
	Determines whether the value of the ACI field SECURITY-TOKEN is verified on each call.						
INCLUDE-CLASS	<u>YES</u> NO	O	z				
	Determines whether the class name is included in the resource check.						
INCLUDE-NAME	<u>YES</u> NO	O	z				
	Determines whether the server name is included in the resource check.						
INCLUDE-SERVICE	<u>YES</u> NO	O	z				
	Determines whether the service name is included in the resource check.						
LDAP-PERSON-BASE-BINDDN	<i>ldapDn</i>	O	z	u	w		
	Used with LDAP authentication to specify the distinguished name where authentication information is stored. This value is prefixed with the user ID field name (see below). Example: LDAP-PERSON-BASE-BINDDN="cn=users,dc=mydomain,dc=com"						
LDAP-REPOSITORY-TYPE	<u>OpenLDAP</u> ActiveDirectory SunOneDirectory Tivoli Novell ApacheDS	O	z	u	w		
	Use predefined known fields for the respective repository type. Specify the repository type that most closely matches your actual repository. In the case of Windows Active Directory, the user ID is typically in the form <i>domainName\userId</i> .						
LDAP-SASL-AUTHENTICATION	<u>NO</u> YES	O			w		

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	<p>Specifies whether or not Simple Authentication and Security Layer (SASL) is to perform the authentication check. In practice, this determines whether or not the password supplied by the user is passed in plain text between the broker kernel and the LDAP server. If SASL is activated, this implies that the password is encrypted.</p> <p>NO Password is sent to LDAP server in plain text. YES Password is sent to LDAP server encrypted.</p>						
LDAP-USERID-FIELD	<u>cn</u> <i>uidFieldName</i>	O	z	u	w		
	<p>Used with LDAP authentication to specify the first field name of a user in the Distinguished Name, for example:</p> <p>LDAP-USERID-FIELD=<i>uid</i></p>						
MAX-SAF-PROF-LENGTH	1-256	O	z				
	<p>This parameter should be increased if the length of the resource checks - that is, the length of the profile comprising "<class>.<server>.<service>" - is greater than 80 bytes.</p> <p>This parameter defaults to 80 if a value is not specified.</p>						
PASSWORD-TO-UPPER-CASE	<u>NO</u> YES	O	z	u	w		b
	<p>Determines whether the password and new password are converted to uppercase before verification.</p>						
PRODUCT	<u>RACF</u> ACF2 TOP-SECRET	O	z				
	<p>Specifies the name of the installed security product. This attribute is used to analyze security-system-specific errors. The following systems are currently supported:</p> <p>ACF2 Security system ACF2 is installed. RACF Security system RACF is installed. Default. TOP-SECRET Security system TOP-SECRET is installed.</p> <p>The default value is used if an incorrect or no value is specified.</p>						
PROPAGATE-TRUSTED-USERID	<u>YES</u> NO	O	z				
	<p>Determines whether a client user ID obtained by means of the trusted user ID mechanism is propagated to a server using the ACI field CLIENT-USERID.</p>						
SAF-CLASS	<u>NBKSAG</u> <i>SAFClassName</i>	O	z				
	<p>Specifies the name of the SAF class/type used to hold the EntireX-related resource profiles.</p>						
SAF-CLASS-IP	<u>NBKSAG</u> <i>SAFClassName</i>	O	z				

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	Specifies the name of the SAF class/type used when performing IP address authorization checks.						
SECURITY-LEVEL	AUTHORIZATION AUTHENTICATION ENCRYPTION	O	z	u	w	v	b
	<p>Specifies the mode of operation.</p> <p>AUTHORIZATION Authorization, authentication, and encryption (not under BS2000/OSD or z/VSE).</p> <p>AUTHENTICATION Authentication and encryption.</p> <p>ENCRYPTION Encryption only.</p> <p>Caution: In version 8.0, the default value for this parameter was "AUTHORIZATION"</p>						
SECURITY-NODE	YES <i>name</i>	O	z				
	<p>This parameter can be used to specify a prefix that is added to all authorization checks, enabling different broker kernels, in different environments, to perform separate authorization checks according to each broker kernel. For example, it is often important to distinguish between production, test, and development environments.</p> <p>YES This causes the broker ID to be used as a prefix for all authorization checks.</p> <p><i>name</i> This causes the actual text (maximum 8 characters) to be prefixed onto all authorization checks.</p> <p>Note: By <i>not</i> setting this parameter, no prefix is added to the resource check (the default behavior).</p>						
TRACE-LEVEL	0 - 4	O	z	u	w	v	b
	Trace level for EntireX Security. It overrides the global value of trace level in the attribute file.						
TRUSTED-USERID	YES NO	O	z				
	Activates the trusted user ID mechanism for broker requests arriving over the local Adm IPC mechanism.						
USERID-TO-UPPER-CASE	NO YES	O	z				b
	Determines whether user ID is converted to uppercase before verification.						
UNIVERSAL	NO YES	O	z				
	Determines whether access to undefined resource profiles is allowed.						
WARN-MODE	NO YES	O	z	u	w		b
	Determines whether a resource check failure results in just a warning or an error.						

TCP/IP-specific Attributes

The TCP/IP-specific attribute section begins with the keyword `DEFAULTS=TCP` as shown in the sample attribute file. It contains attributes that apply to the TCP/IP transport communicator. The transport is activated by `TRANSPORT=TCP` in the Broker-specific section of the attribute file. A maximum of five TCP/IP communicators can be activated by specifying up to five `HOST/PORT` pairs.

Attribute	Values	Opt/Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
CONNECTION-NONACT	<code>n nS nM nH</code>	O	z	u	w	v	b
<p>Non-activity of the TCP/IP connection, after which a close is performed and the connection resources are freed. If this parameter is not specified here, broker will close the connection only when the application (or the network itself) terminates the connection.</p> <p><code>n</code> Same as <code>nS</code>.</p> <p><code>nS</code> Non-activity time in seconds (min. 600, max. 2147483647).</p> <p><code>nM</code> Non-activity time in minutes (min. 10, max. 35791394).</p> <p><code>nH</code> Non-activity time in hours (max. 596523).</p> <p>If not specified, the connection non-activity test is disabled. On the stub side, non-activity can be set with the environment variable <code>ETB_NONACT</code>. See <i>Limiting the TCP/IP Connection Lifetime</i> in the platform-specific <i>Stub Administration</i> sections of the EntireX documentation.</p>							
HOST	<code>0.0.0.0 HostName IP address</code>	O	z	u	w	v	b
<p>The address of the network interface on which broker will listen for connection requests.</p> <p>If <code>HOST</code> is not specified, broker will listen on any attached interface adapter of the system (or stack).</p> <p>A maximum of five <code>HOST/PORT</code> pairs can be specified to start multiple instances of broker's TCP/IP transport communicator.</p>							
MAX-MESSAGE-LENGTH	<code>2147483647 n</code>	O	z	u	w	v	b

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	Maximum message size that the broker kernel can process using transport method TCP/IP. The default value represents the highest positive number that can be stored in a four-byte integer.						
PORT	1025 - 65535	O	z	u	w	v	b
	<p>The TCP/IP port number on which the broker will listen for connection requests.</p> <p>If specified, PORT overrides broker attribute TCP-PORT.</p> <p>Note: TCP-PORT will be retired with the next version.</p> <p>If PORT is not specified but TCP-PORT is specified, TCP-PORT is used.</p> <p>If TCP-PORT is not specified, the broker will attempt to find its TCP/IP port number from the TCP/IP Services file, using <i>getserobyname</i>. If broker cannot find its TCP/IP port number from the TCP/IP Services file, it will use the default value of 1971.</p> <p>A maximum of five HOST/PORT pairs can be specified to start multiple instances of broker's TCP/IP transport communicator.</p>						
RESTART	YES NO	O	z	u	w	v	b
	<p>YES The broker kernel will attempt to restart the TCP/IP communicator.</p> <p>NO The broker kernel will not try to restart the TCP/IP communicator.</p> <p>If specified, RESTART overrides broker attribute TCP-RESTART.</p> <p>Note: TCP-RESTART will be retired with the next version.</p> <p>If RESTART is not specified but TCP-RESTART is specified, TCP-RESTART is used.</p> <p>The RESTART setting applies to all TCP/IP communicators.</p>						
RETRY-LIMIT	20 n UNLIM	O	z	u	w	v	b
	<p>Maximum number of attempts to restart the TCP/IP communicator.</p> <p>If specified, RETRY-LIMIT overrides broker attribute TCP-RETRY-LIMIT.</p> <p>Note: TCP-RETRY-LIMIT will be retired with the next version.</p> <p>If RETRY-LIMIT is not specified but TCP-RETRY-LIMIT is specified, TCP-RETRY-LIMIT is used.</p> <p>The RETRY-LIMIT setting applies to all TCP/IP communicators.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VS	BS2000
RETRY - TIME	<u>3</u> M n nS nM nH	O	z	u	w	v	b
<p>Wait time between stopping the TCP/IP communicator due to an unrecoverable error and the next attempt to restart it.</p> <p><i>n</i> Same as <i>n</i> S. <i>n</i> S Wait time in seconds (max. 2147483647). <i>n</i> M Wait time in minutes (max. 35791394). <i>n</i> H Wait time in hours (max. 596523).</p> <p>Minimum wait time is 1S.</p> <p>If specified, RETRY - TIME overrides broker attribute TCP - RETRY - TIME.</p> <p>Note: TCP - RETRY - TIME will be retired with the next version.</p> <p>If RETRY - TIME is not specified but TCP - RETRY - TIME is specified, TCP - RETRY - TIME is used.</p> <p>The RETRY - TIME setting applies to all TCP/IP communicators.</p>							
REUSE - ADDRESS	<u>YES</u> NO	O	z	u		v	b
	YES <u>NO</u>	O			w		
<p>YES The TCP port assigned to the broker can be taken over and assigned to other applications (this is the default value on all non-Windows platforms).</p> <p>NO The TCP port assigned to the broker cannot be taken over and assigned to other applications. This is the default setting on Windows, and we strongly advise you do not change this value on this platform.</p> <p>Note: This setting might be required at your site when restarting broker immediately after stopping it. This is due to the inherent latency of the TCP/IP stack when closing connections.</p>							
STACK - NAME	<i>StackName</i>	O	z				
<p>Name of the TCP/IP stack that the broker is using.</p> <p>If not specified, broker will connect to the default TCP/IP stack running on the machine.</p>							
TRACE - LEVEL	<u>0</u> - 4	O	z	u	w	v	b
<p>The level of tracing to be performed while the broker is running with transport method TCP/IP. It overrides the global value of trace level for all TCP/IP routines.</p>							

Attribute	Values	Opt/ Req	Operating System							
			z/OS	UNIX	Windows	zVSE	BS2000			
	<p>0 No tracing. Default value.</p> <p>1 Display IP address of incoming request, display error number of outgoing error responses.</p> <p>2 All of trace level 1, plus errors if request entries could not be allocated.</p> <p>3 All of trace level 2, plus all routines executed.</p> <p>4 All of trace level 3, plus function arguments and return values.</p> <p>If you modify the TRACE - LEVEL attribute, you must restart the broker for the change to take effect. For temporary changes to TRACE - LEVEL without restarting the broker, use System Management Hub or ETBCMD.</p> <p>Trace levels 2, 3, and 4 should be used only when requested by Software AG support.</p>									

c-tree-specific Attributes

The c-tree-specific attribute section begins with the keyword `DEFAULTS = CTREE`. The attributes in this section are optional. This section applies only if `PSTORE-TYPE = CTREE` is specified.

Not available under z/OS, BS2000/OSD, z/VSE.

Attribute	Values	Opt/Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
MAXSIZE	<i>n</i> <i>nM</i> <i>nG</i>	O		u	w		
<p>Defines the maximum size of c-tree data files. Broker allocates one data file for control data and another data file for message data:</p> <p><i>n</i> Maximum size in MB. <i>nM</i> Maximum size in MB. <i>nG</i> Maximum size in GB.</p>							
PAGESIZE	<i>n</i> <i>nK</i>	O		u	w		
<p>Determines how many bytes are available in each c-tree node. <code>PSTORE COLD</code> start is required after changing this value.</p> <p><i>n</i> Same as <i>nK</i> <i>nK</i> PAGESIZE in KB.</p> <p>The default and minimum value is 8 KB.</p> <p>If PSD Reason Code = 527 is returned during UOW write processing, increase the PAGESIZE value and restart broker with <code>PSTORE=COLD</code>, or migrate the existing PSTORE to a new PSTORE with an increased PAGESIZE value. See <i>Migrating the Persistent Store</i> in the general administration documentation and define the increased PAGESIZE value for the load broker.</p>							
PATH	A255	O		u	w		
<p>Path name of the target directory for c-tree index and data files.</p>							
SYNCIO	<u>NO</u> YES	O		u	w		
<p>Controls the open mode of the c-tree transaction log.</p> <p>NO c-tree transaction log is not opened in synchronous mode. Default. YES c-tree transaction log is opened in synchronous mode to improve data security. It may degrade performance of PSTORE operations, but offers the highest level of data</p>							

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	zVSE	BS2000
	security. See <i>c-tree Database as Persistent Store</i> in the UNIX and Windows administration documentation.						
TRACE - LEVEL	0-8	O		u	w		
	Trace level for c-tree persistent store. It overrides the global value of trace level in the attribute file.						

SSL-specific Attributes

The SSL-specific attribute section begins with the keyword `DEFAULTS=SSL` as shown in the sample attribute file. The attributes in this section are needed to execute the SSL communicator of the EntireX Broker kernel. In this section, "SSL" also applies to TLS (Transport Layer Security).

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSSE	BS2000
CIPHER-SUITE	<i>string</i>	O	z	u	w		b
	<p>String that is passed to the underlying SSL implementation. SSL is a standardized protocol that uses different cryptographic functions (hash functions, symmetric and asymmetric encryption etc.). Some of these must be implemented in the SSL stack; others are optional. When an SSL connection is created, both parties agree by "handshake" on the <i>cipher suite</i>, that is, the algorithms and key lengths used. In a default scenario, this information depends on what both sides are capable of. It can be influenced by setting the attribute <code>CIPHER-SUITE</code> for the SSL server side (the broker always implements the server side). The stubs connect to the broker and thereby become the SSL clients.</p> <p>Under UNIX and Windows, the OpenSSL implementation of the SSL server side is used; on z/OS and BS2000/OSD it is GSK.</p> <p>Example for OpenSSL:</p> <p><code>CIPHER-SUITE=RC4-MD5</code> Use RC4 with standard 128-bit key and MD5 as hash.</p> <p><code>CIPHER-SUITE=EXP-EDH-DSS-DES-CBC-SHA</code> Extreme example.</p> <p>Example for GSK:</p> <p><code>CIPHER-SUITE=090306</code> Use DES and SHA1 with export key lengths, or RC4 and MD5 with export key lengths, or RC2 and MD5 with export key lengths.</p> <p>For more information see:</p> <ul style="list-style-type: none"> ■ OpenSSL http://www.openssl.org/docs/apps/ciphers.html 						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	<p>■ GSK http://publib.boulder.ibm.com/iseres/v5r2/ic2924/index.htm?info/apis/gsk_attribute_set_buffer.htm</p>						
CONNECTION-NONACT	<i>n</i> <i>nS</i> <i>nM</i> <i>nH</i>	O	z	u	w		b
	<p>Non-activity of the SSL connection, after which a close is performed and the connection resources are freed. If this parameter is not specified here, broker will close the connection only when the application (or the network itself) terminates the connection.</p> <p><i>n</i> Same as <i>nS</i>. <i>nS</i> Non-activity time in seconds (min. 600, max. 2147483647). <i>nM</i> Non-activity time in minutes (min. 10, max. 35791394). <i>nH</i> Non-activity time in hours (max. 596523).</p> <p>If not specified, the connection non-activity test is disabled.</p>						
HOST	<i>hostname</i>	O	z	u	w		b
	<p>The address of the network interface on which broker will listen for connection requests.</p> <p>If HOST is not specified, broker will listen on any attached interface adapter of the system (or stack).</p> <p>A maximum of five HOST/PORT pairs can be specified to start multiple instances of EntireX Broker's TCP/IP transport communicator.</p>						
KEY-LABEL	<i>name</i>	O	z				
	<p>The label of the key in the RACF keyring that is used to authenticate the broker kernel (see also TRUST-STORE parameter).</p> <p>(Example: "ETBCERT")</p>						
KEY-FILE	<i>file name</i>	R		u	w		b
	<p>File that contains the broker's private key (if not contained in KEY-STORE).</p> <p>(Example: <i>MyAppKey.pem</i>)</p> <p>Note: EntireX Broker supports only key files of type .pem. Files of type .jks are not supported.</p>						
KEY-PASSWD	<i>password (A32)</i>	R		u	w		b
	<p>Password used to protect the private key. Unlocks <i>MyAppKey.pem</i>. Deprecated. See KEY-PASSWD-ENCRYPTED below.</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/SE	BS2000
KEY-PASSWD-ENCRYPTED	<i>encrypted value</i> (A64)	R		u	w		b
Password used to protect the private key. Unlocks <i>MyAppKey.pem</i> . This attribute replaces KEY-PASSWD to avoid a clear-text password as attribute value. If KEY-PASSWD and KEY-PASSWD-ENCRYPTED are both supplied, KEY-PASSWD-ENCRYPTED takes precedence.							
KEY-STORE	<i>file name</i>	R		u	w		b
SSL certificate; may contain the private key. (Example: <i>ExxAppCert.pem</i>) Note: EntireX Broker supports only keystores of type .pem. Files of type .jks are not supported.							
MAX-MESSAGE-LENGTH	<u>2147483647</u> <i>n</i>	O	z	u	w		b
Maximum message size that the broker kernel can process using transport method SSL. The default value represents the highest positive number that can be stored in a four-byte integer.							
PORT	<i>1025 - 65535</i>	O	z	u	w		b
The SSL port number on which the broker will listen for connection requests. If not changed, this parameter takes the standard value as specified in the example attribute file. If the port number is not specified, the broker will use the default value of 1958.							
RESTART	<u>YES</u> NO	O	z	u	w		b
YES The broker kernel will attempt to restart the SSL communicator (this is the default value). NO The broker kernel will not attempt to restart the SSL communicator.							
RETRY-LIMIT	<u>20</u> <i>n</i> UNLIM	O	z	u	w		b
Maximum number of attempts to restart the SSL communicator.							
RETRY-TIME	<u>3M</u> <i>n</i> <i>nS</i> <i>nH</i>	O	z	u	w		b
Wait time between suspending SSL communication due to unrecoverable error and the next attempt to restart it. <i>n</i> Same as <i>nS</i> . <i>nS</i> Wait time in seconds (max.2147483647). <i>nM</i> Wait time in minutes (max. 35791394). <i>nH</i> Wait time in hours (max. 596523).							

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VSE	BS2000
	Minimum: 1S						
REUSE-ADDRESS	YES NO	O	z	u	w		b
	<p>YES The SSL port assigned to the broker can be taken over and assigned to other applications (this is the default value).</p> <p>NO The SSL port assigned to the broker cannot be taken over and assigned to other applications.</p> <p>Note: This setting might be required at your site when restarting broker immediately after stopping it. This is due to the inherent latency of the TCP/IP stack when closing connections.</p>						
STACK-NAME	<i>name</i>	O	z	u	w		
	<p>Name of the TCP/IP stack that the broker is using.</p> <p>If not specified, broker will connect to the default TCP/IP stack running on the machine.</p>						
TRACE-LEVEL	0 - 4	O	z	u	w		b
	<p>The level of tracing to be performed while the broker is running with transport method SSL or TLS. It overrides the global value of trace level for all SSL or TLS routines.</p> <p>0 No tracing. Default value.</p> <p>1 Display IP address of incoming request, display error number of outgoing error responses.</p> <p>2 All of trace level 1, plus errors if request entries could not be allocated.</p> <p>3 All of trace level 2, plus all routines executed.</p> <p>4 All of trace level 3, plus function arguments and return values.</p> <p>If you modify the TRACE-LEVEL attribute, you must restart the broker for the change to take effect. For temporary changes to TRACE-LEVEL without restarting the broker, use System Management Hub or ETBCMD.</p> <p>Trace levels 2, 3, and 4 should be used only when requested by Software AG support.</p>						
TRUST-STORE	<i>file name keyring</i>	R	z	u	w		b
	<p>Location of the store containing certificates of trust Certificate Authorities (or CAs).</p>						

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/SE	BS2000
	<p>z/OS Specify the RACF keyring using the following format: [<i>USER-ID</i> /] <i>RING-NAME</i>. If no value for <i>USER-ID</i> is provided, the keyring is assumed to be associated with the user ID that the broker kernel is running under.</p> <p>BS2000/OSD/Windows/UNIX Specify the file name of the CA certificate store. Examples: <i>EXXCACERT.PEM</i>, <i>C:\Certs\ExxCACert.pem</i></p>						
VERIFY-CLIENT	<u>NO</u> YES	<input type="radio"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<p>YES Additional client certificate required.</p> <p>NO No client certificate required (default).</p>						

DIV-specific Attributes

The DIV-specific attribute section begins with the keyword `DEFAULTS = DIV`. The attributes in this section are required if `PSTORE-TYPE = DIV` is specified.

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VMSE	BS2000
DIV	A511	R	z				
<p>The VSAM Persistent Store parameters, enclosed in double quotes (""). The value can span more than one line. See <i>Format Parameters</i> under <i>Managing the Broker Persistent Store</i> in the z/OS administration documentation for details of the parameters. In previous versions of EntireX, these parameters were read from the SYSIN DD during broker kernel startup.</p>							

Adabas-specific Attributes

The Adabas-specific attribute section begins with the keyword `DEFAULTS = ADABAS`. The attributes in this section are required if `PSTORE-TYPE = ADABAS` is specified. In previous versions of EntireX, these Adabas-specific attributes and values were specified in the broker-specific `PSTORE-TYPE` attribute.

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/VMSE	BS2000
BLKSIZE	126-20000	O	z	u	w	v	b
<p>Optional blocking factor used for message data. If not specified, broker will split the message data into 2 KB blocks to be stored in Adabas records. The maximum value depends on the physical device assigned to data storage. See the <i>Adabas</i> documentation.</p> <p>For reasons of efficiency, do not specify a BLKSIZE much larger than the actual total size of the UOW data to be written. The total UOW size is the sum of all messages in the UOW plus 41 bytes of header information. This takes effect only after COLD start.</p> <p>The BLKSIZE parameter applies only for a cold start of broker; subsequently the value of BLKSIZE is taken from the last cold start.</p> <p>Default value is 2000.</p>							
DBID	1 - 32535	R	z	u	w	v	b

Broker Attributes

Attribute	Values	Opt/ Req	Operating System				
			z/OS	UNIX	Windows	z/SE	BS2000
	Database ID of Adabas database where the persistent store resides.						
FNR	1 - 32535	R	z	u	w	v	b
	File number of broker persistent store file.						
FORCE-COLD	N Y	O	z	u	w	v	b
	Determines whether a broker cold start is permitted to overwrite a persistent store file that has been used by another broker ID and/or platform. Specify Y to allow existing information to be overwritten.						
MAXSCAN	0-n	O	z	u	w	v	b
	Limits display of persistent UOW information in the persistent store through Command and Information Services. Default value is 1000.						
OPENRQ	N Y	O	z	u	w	v	b
	Determines whether driver for Adabas persistent store is to issue an OPEN command to Adabas.						
SVC	200-255	R	z			v	
	Use this parameter to specify the Adabas SVC number to be used by the Adabas persistent store driver.						
TRACE-LEVEL	0-8	O	z	u	w	v	b
	Trace level for Adabas persistent store. It overrides the global value of trace level in the attribute file.						

Variable Definition File

The broker attribute file contains the configuration of one EntireX Broker instance. In order to share attribute files between different brokers, you identify the attributes that are unique and move them to a variable definition file. This file enables you to share one attribute file among different brokers. Each broker in such a scenario requires its own variable definition file.

The following attributes are considered unique for each machine:

- `BROKER- ID` (in Broker-specific attribute `BROKER- ID`)
- `NODE` (in Entire Net-Work-specific attribute `NODE`)
- `PORT` (in `PORT (SSL)` and `PORT (TCP/IP)`)

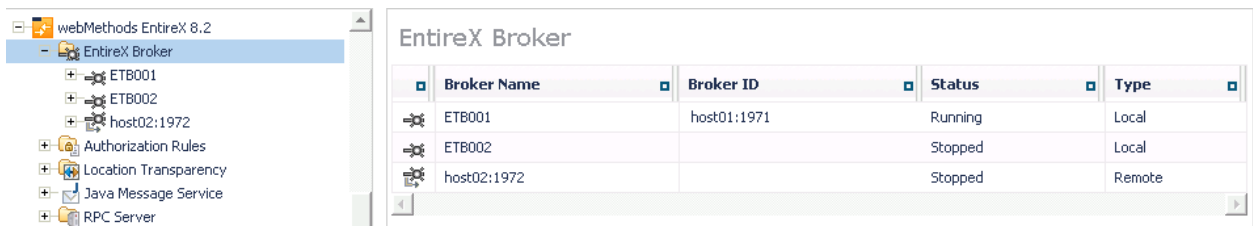
How you use the variable definition file will depend upon your particular needs. For instance, some optional attributes may require uniqueness - for example, `DBID` and `FNR` in `DEFAULTS=ADABAS` - so that you may specify the persistent store.

5

Introduction to Broker Administration using SMH

Before you log in to the System Management Hub for the first time, see *Initial Login Considerations* in the System Management Hub for EntireX documentation. See also *Broker Service 'etbsrv'* under *Post-installation Steps under Windows*.

EntireX Broker instances are administered from the EntireX Broker System Management Hub node. The **EntireX Broker** node is located below the EntireX node in the System Management Hub tree view. When the **EntireX Broker** node is expanded, all of the brokers that are known to the current System Management Hub host are listed. The list consists of all the broker instances configured on the host running the System Management Hub (“local” brokers) and broker instances configured on other hosts that the user has defined to the System Management Hub (“remote” brokers). The node of a broker instance can be expanded if its broker is currently running. Below the node you can see the list of all Command and Information Services. The broker stub nodes allow a detailed runtime administration of the broker.



The screenshot shows the System Management Hub interface. On the left, a tree view displays the 'EntireX Broker' node expanded under 'webMethods EntireX 8.2'. The tree view includes sub-nodes for 'ETB001', 'ETB002', 'host02:1972', 'Authorization Rules', 'Location Transparency', 'Java Message Service', and 'RPC Server'. On the right, a table titled 'EntireX Broker' displays the following data:

Broker Name	Broker ID	Status	Type
ETB001	host01:1971	Running	Local
ETB002		Stopped	Local
host02:1972		Stopped	Remote

Note: The list of the known brokers is maintained by a special administrative service. The SMH agents communicate with it or directly with the listed brokers to perform all necessary actions. For more information see [Configuring the Administration Service](#).

6 Managing the List of Brokers with SMH

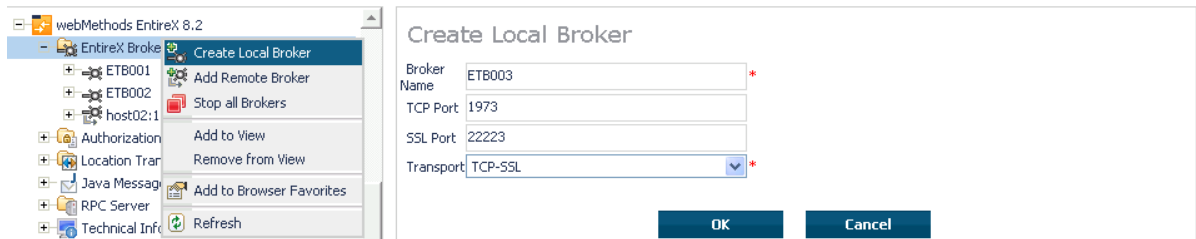
- Creating a Local Broker 95
- Deleting a Local Broker 95
- Adding a Remote Broker Instance to System Management Hub 97
- Removing a Remote Broker Instance from System Management Hub 97
- Stopping All Local Brokers from System Management Hub 99
- Setting the User Credentials for a Broker Instance 100
- Clearing the User Credentials for a Broker Instance 101
- Setting SSL or TLS Parameters 101

See also *Administration Service Messages* under *Error Messages and Codes*.

Creating a Local Broker

▶ To create a local broker

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 From the context menu, choose **Create Local Broker**.
- 3 Enter **Broker ID**, **TCP Port Number**, and **SSL Port Number**. The valid port number range is 1024 - 65535.
- 4 Select a transport method.
- 5 Choose **OK**.



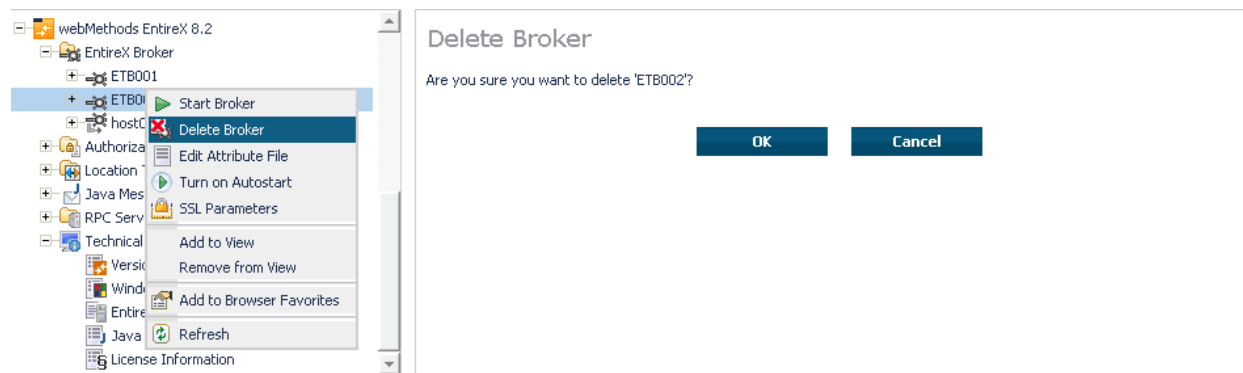
When a local broker is added using SMH, a working directory is created for the new broker in the EntireX directory *config/etb*. This directory contains an attribute file, and the SSL certificates from the EntireX directory *config/etb* are also copied to this directory. If the broker is to use its own SSL certificates, these must be replaced or the attribute file modified accordingly.

The attributes of the new broker are checked. If, for example, a broker already exists with the specified port, a corresponding error message is given.

Deleting a Local Broker

▶ To delete a local broker

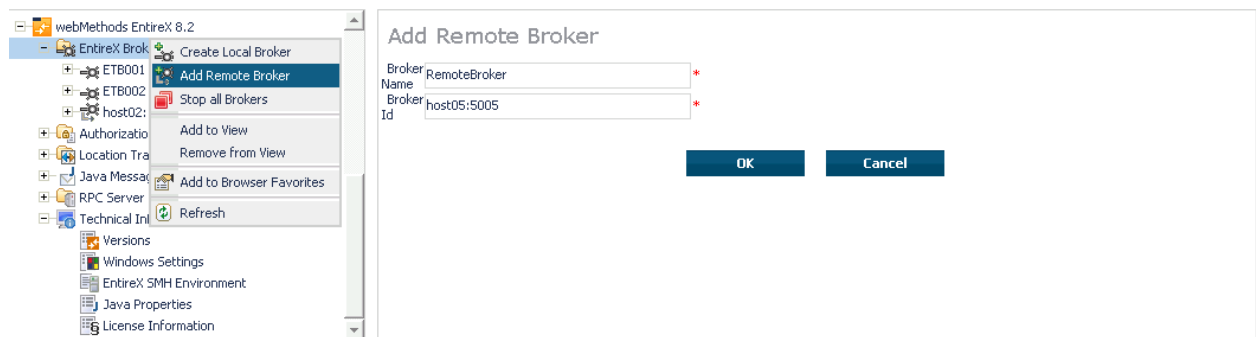
- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be deleted.
- 3 From the context menu, choose **Delete Broker**.
- 4 Choose **OK**.



Adding a Remote Broker Instance to System Management Hub

▶ To add a remote broker instance to System Management Hub

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 From the context menu, choose **Add Remote Broker**.
- 3 In the field **Broker Name**, enter a valid name. Permitted characters are A-Z, a-z, 0-9.
- 4 In the field **Broker ID**, enter the ID of an existing broker. Permitted formats: host:port[:protocol], protocol://host:port[?sslparameters].
- 5 Choose **OK**.



Function **Add Remote Broker** creates a directory for a remote broker. The working directories for a remote broker start with "RB". This directory contains an attribute file with the URL of the remote broker. This directory will also be used for transferring the log and attribute files to or from the remote broker. If the broker can only be addressed using the SSL protocol, the SSL certificates should also be stored in this directory. When a remote broker is added, the default SSL certificates from the EntireX *config/etb* directory are copied to the working directory of the remote broker. If this broker is to use other certificates, replace them manually.

Removing a Remote Broker Instance from System Management Hub

▶ To remove a remote broker instance from System Management Hub

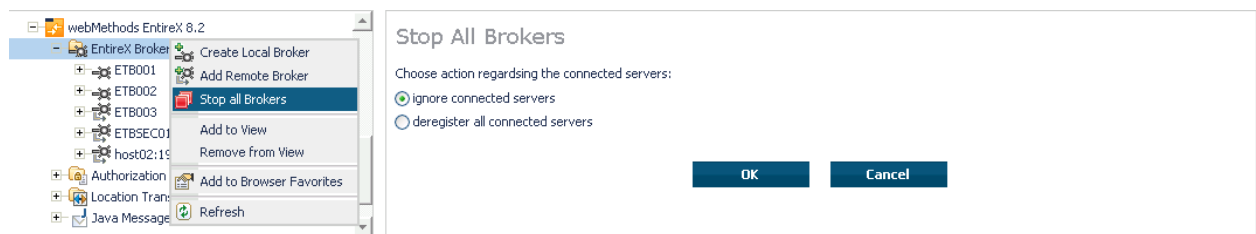
- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the remote broker instance to be removed.
- 3 From the context menu, choose **Remove Definition**.
- 4 Choose **OK**.



Stopping All Local Brokers from System Management Hub

▶ To stop all local brokers from System Management Hub

- 1 Select the **EntireX Broker** node below the **EntireX** node in **System Management**.
- 2 From the context menu, choose **Stop All Brokers**.
- 3 Choose the stop mode.
- 4 Choose **OK** to confirm deregistration.

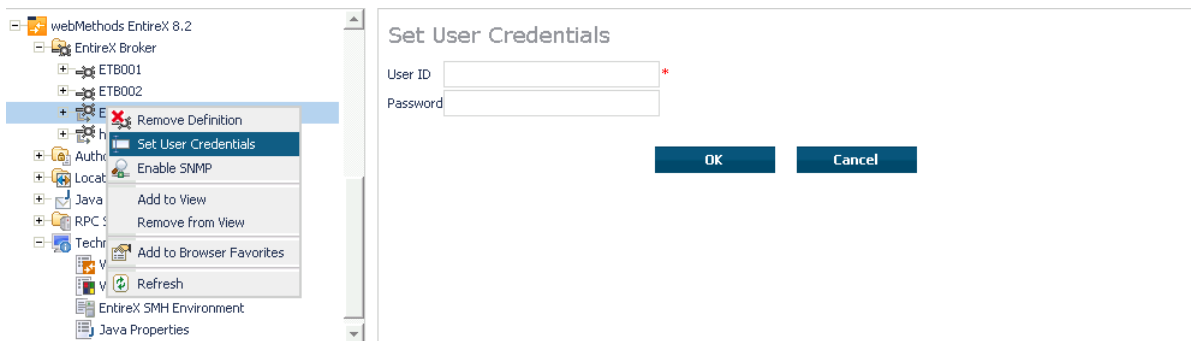


Setting the User Credentials for a Broker Instance

Before a remote broker instance or instance of a local broker that uses LDAP authentication can be administered, user credentials (user ID and password) must be set.

▶ **To set user credentials**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance.
- 3 From the context menu, choose **Set User Credentials**.
- 4 Enter a **User ID** and **Password** that are valid for the broker instance.
- 5 Choose **OK**.
- 6 Choose **OK** when the success message is displayed.



Clearing the User Credentials for a Broker Instance

Once a remote broker instance has been administered, the user credentials should be cleared.

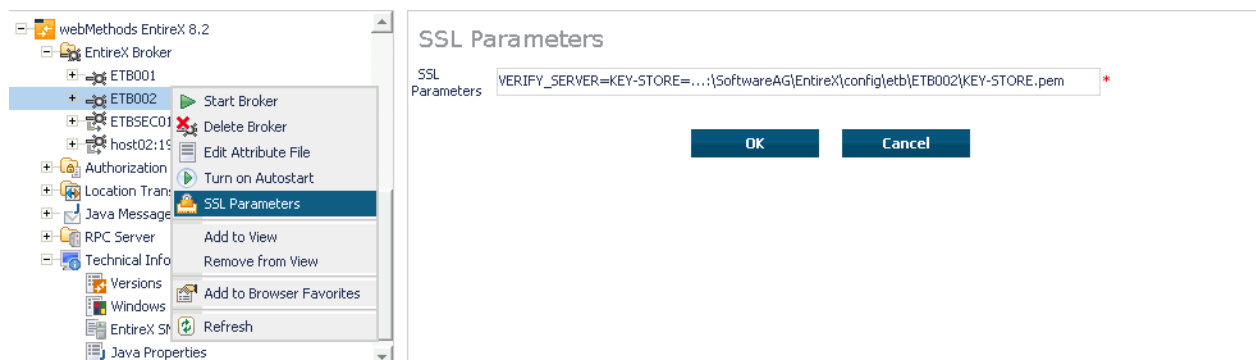
▶ To clear user credentials

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance.
- 3 From the context menu, choose **Clear User Credentials**. A confirmation screen will appear.
- 4 Choose **OK** or **Cancel**.
- 5 Choose **OK** when the success message is displayed.

Setting SSL or TLS Parameters

▶ To edit a broker SSL file

- 1 Select the **EntireX Broker** node below the **webMethods EntireX** node in System Management Hub.
- 2 Select the broker name to be administered.
- 3 Choose **SSL Parameters**.
- 4 Make your changes.
- 5 Choose **Save**.



7

Configuring a Single Broker with SMH

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Starting a Local Broker

▶ To start a local broker

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be started.
- 3 From the context menu, choose **Start Broker**.



Note: Before you start a local Broker, make sure that the Broker's `etbsrv` service or daemon is running and try again. See *Broker Service 'etbsrv'* under *Post-installation Steps under Windows*.

A broker process is started in its working directory. The started broker establishes a connection to the local Administration Service and provides information such as the used and activated ports. The information is updated every 60 seconds. If an attribute file is modified after a broker has been started, this does not result in incorrect information. If a broker is started manually by a local user and the attribute file is not in the working directory under the EntireX directory `config/etb`, the broker can be administered only to a limited extent. It is only possible to stop this broker. Each local broker is displayed by the Administration Service in SMH. The brokers that were started manually have the status "Running: unmanaged Broker with restricted access" in SMH. If the broker is to be administered without restrictions, the working directory and attribute file must be located under the EntireX directory `config/etb`.

Restarting a Local Broker

▶ **To restart a local broker**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be administered.
- 3 From the context menu, choose **Restart Broker**.

Stopping a Local Broker

▶ **To stop a local broker**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be administered.
- 3 From the context menu, choose **Stop Broker**.
- 4 Choose **OK**.

Administering a Broker Attribute File

This section covers the following topics:

- Editing an Attribute File
- Uploading an Attribute File
- Downloading an Attribute File

Editing an Attribute File

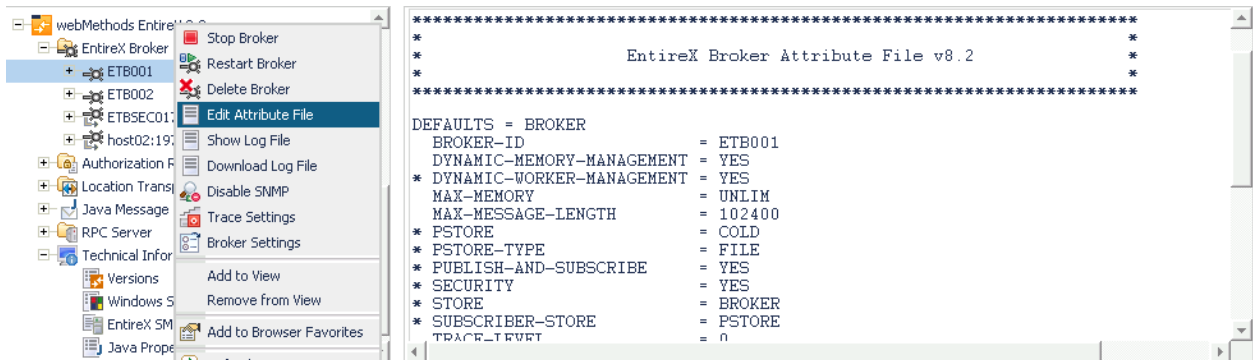
▶ To edit a broker attribute file

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be administered.
- 3 From the context menu, choose **Edit Attribute File**.



Note: There is another vertical scrollbar for the editor itself. Scroll the horizontal scrollbar to the right in order to see it. In addition, you can use Ctrl Home and Ctrl End to get the first and the last pages, respectively.

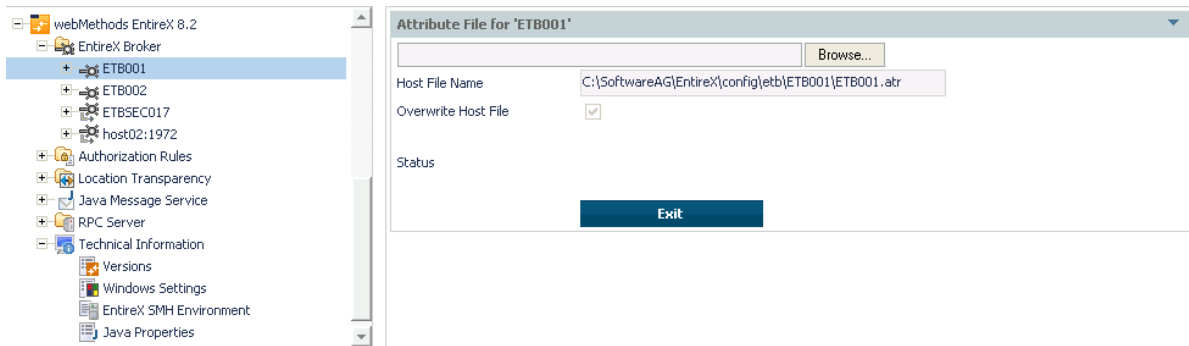
- 4 Edit your changes.
- 5 Choose **Save**.
- 6 Choose **Restart** for the changes to take effect.



Uploading an Attribute File

▶ **To upload a broker attribute file**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be administered.
- 3 From the context menu, choose **Edit Attribute File**.
- 4 Choose **Upload**.
- 5 Choose **Browse** and select the local attribute file.



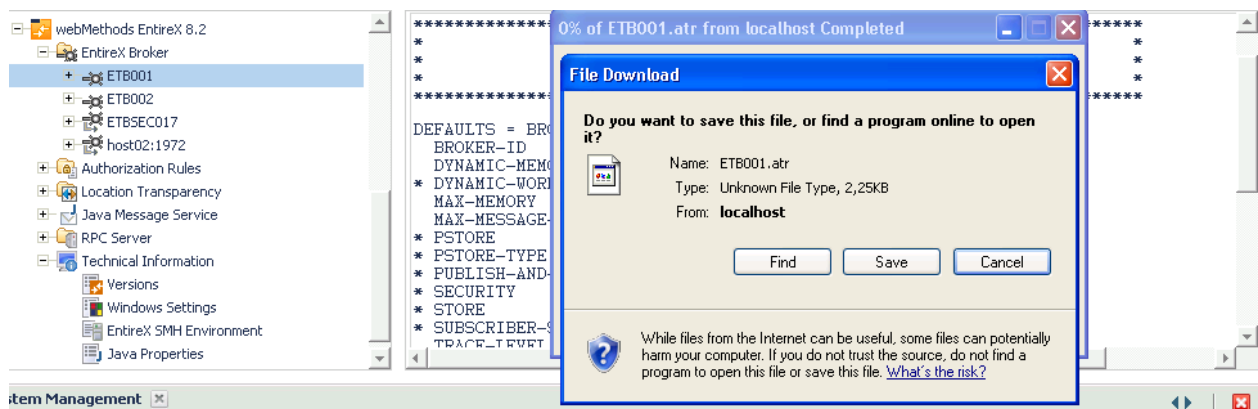
As a result, the upload starts automatically followed by a message "Upload completed!".

Downloading an Attribute File

▶ To download a broker attribute file

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be administered.
- 3 From the context menu, choose **Edit Attribute File**.
- 4 Choose **Download**.

In the ensuing dialog box, choose **Save**.



Administering a Log File

This section covers the following topics:

- [Showing a Log File](#)
- [Downloading a Log File](#)

Showing a Log File

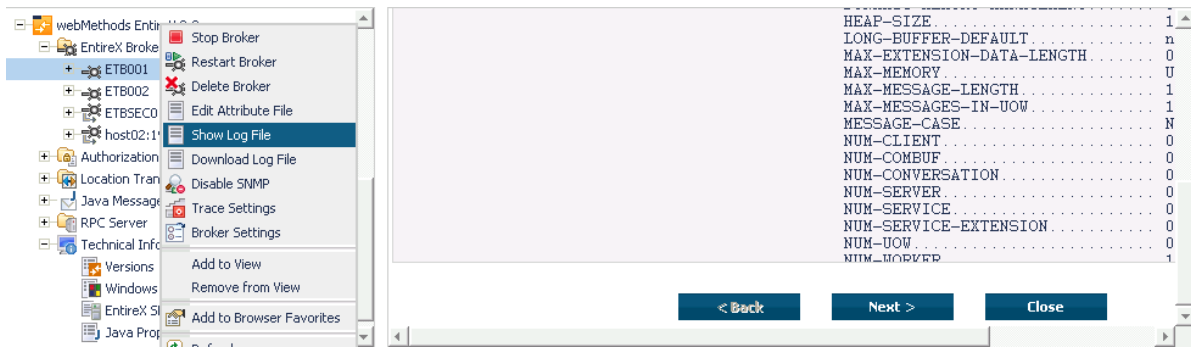
▶ To show a broker log file

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be administered.
- 3 From the context menu, choose **Show Log File**.



Note: There is another vertical scrollbar for the editor itself. Scroll the horizontal scrollbar to the right in order to see it. In addition, you can use **Ctrl Home** and **Ctrl End** to get the first and the last pages, respectively.

4 Choose **Close**.



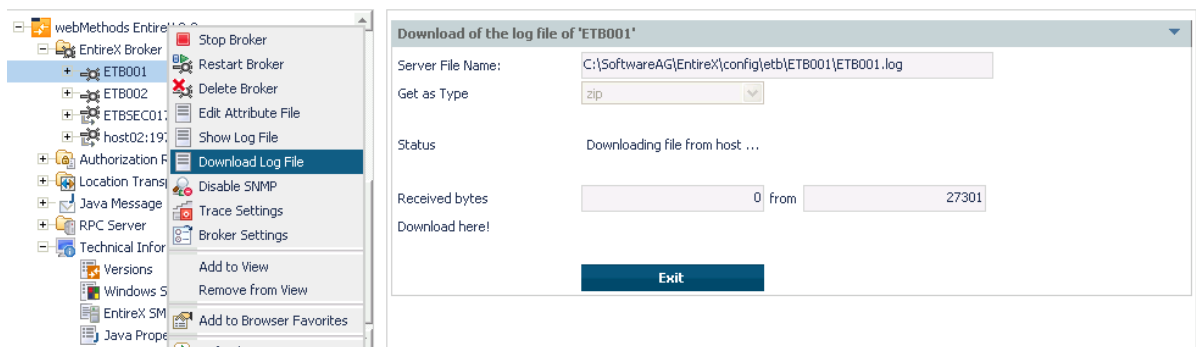
Downloading a Log File

▶ To download a broker log file

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be administered.
- 3 From the context menu, choose **Download Log File**.

A message "Download file from host" appears and after it a hyperlink labeled **Download**.

- 4 Follow the hyperlink **Download**.



- 5 Use the ensuing dialog box to save the log file on the local machine.

Setting the Local Broker Autostart Value

The autostart value of a broker instance determines whether it will be started when the computer is restarted.

▶ **To set the Autostart value**

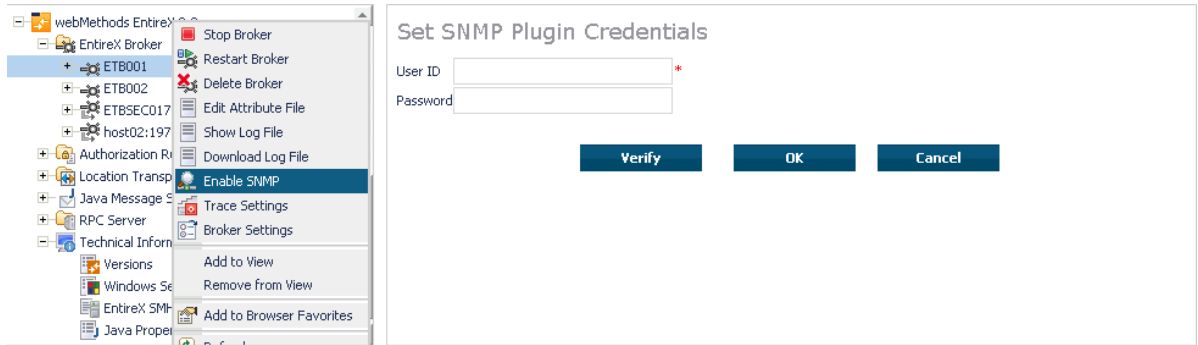
- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker name to be administered.
- 3 If the broker instance is currently started automatically, only the **Turn off Autostart** command is visible; if the broker instance is currently *not* started automatically, the **Turn on Autostart** command is visible.
- 4 Choose either **Turn on Autostart** or **Turn off Autostart**.

Enabling the SNMP Plug-in

Before a broker can be administered by SNMP, the SNMP plug-in must be enabled. In addition, the SNMP Plug-in credentials (user ID and password) must be set.

▶ **To enable the SNMP plug-in**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker.
- 3 From the context menu, choose **Enable SNMP**.
- 4 Enter a user ID and password that are valid for the broker instance.
- 5 Choose **Verify** to check if a logon to the broker is okay with the SNMP plug-in credentials, or click **OK** to save the SNMP plug-in credentials without any verification.
- 6 Choose **Close** when the Success message is displayed.



Disabling the SNMP Plug-in

▶ To disable the SNMP plug-in

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker.
- 3 From the context menu, choose **Disable SNMP**.
- 4 Choose **Close** when the Success message is displayed.

8

Using the Broker Information Service with SMH

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Administering a Broker Instance

▶ To administer a broker instance

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance to be administered.
- 3 If the broker instance is a remote broker instance (running on another node), see [Setting the User Credentials for a Broker Instance](#).
- 4 Expand the broker instance node to view and administer the properties for the following objects:

Object	Information Reply Structure	Summary View	Filter Results
Broker	<i>BROKER-OBJECT</i>		
Worker	<i>WORKER-OBJECT</i>		
Service	<i>SERVICE-OBJECT</i>	x	x
Server	<i>CLIENT-SERVER-PARTICIPANT-OBJECT</i>	x	x
Client	<i>CLIENT-SERVER-PARTICIPANT-OBJECT</i>	x	x
Participant	<i>CLIENT-SERVER-PARTICIPANT-OBJECT</i>	x	
Conversation	<i>CONVERSATION-OBJECT</i>	x	
Persistent Store	<i>PSF-OBJECT</i>	x	x
Persistent Store DIV	<i>PSFDIV-OBJECT</i>		
Persistent Store Adabas	<i>PSFADA-OBJECT</i>		
Persistent Store File	<i>PSFFILE-OBJECT</i>		
Persistent Store c-tree	<i>PSFCTREE-OBJECT</i>		
Topic	<i>TOPIC-OBJECT</i>		x
Subscriber	<i>SUBSCRIBER-OBJECT</i>	x	x
Publisher	<i>PUBLISHER-OBJECT</i>	x	x
Publication	<i>PUBLICATION-OBJECT</i>		x
Cmdlog Filter	<i>CMDLOG_FILTER-OBJECT</i>		
Security	<i>SECURITY-OBJECT</i>		
TCP	<i>TCP-OBJECT</i>		
SSL	<i>SSL-OBJECT</i>		
Net-Work	<i>NET-OBJECT</i>		
Pool-Usage	<i>POOL-USAGE-OBJECT</i>		
Resource-Usage	<i>RESOURCE-USAGE-OBJECT</i>		
Statistics	<i>STATISTICS-OBJECT</i>		

Object	Information Reply Structure	Summary View	Filter Results
User	USER-OBJECT	x	x
Worker-Usage	WORKER-USAGE-OBJECT		

Notes

- For a summary view, expand the node and select the required object:

The screenshot shows the 'Service' summary view. On the left, a tree view shows the hierarchy: webMethods EntireX 8.2 > EntireX Broker > ETB001 > Service. The 'Service' node is selected. The main pane displays a table with the following data:

Class/Server/Service	Deregister Service	Active servers	Attach managers	Active conv
SAG/ETBCIS/INFO		1	0	1
SAG/ETBCIS/USER-INFO		1	0	0
SAG/ETBCIS/CMD		1	0	0
SAG/ETBCIS/PARTICIPANT-SHUTDOWN		1	0	0
SAG/ETBCIS/SECURITY-CMD		1	0	0
SAG/ETBCIS/RPCCIS		1	0	0
RPC/RPCCIS/CALLNAT		1	0	2

- For detailed information, select an item from the summary view:

The screenshot shows the 'Service Details' view. On the left, the tree view is the same as in the previous screenshot, but the 'Service' node is expanded to show its sub-items. The main pane displays a table with the following data:

Property	Value
Server Class	SAG
Server Name	ETBCIS
Service	INFO
Translation	
Active Servers	1
Conversations (active)	1
Conversations (high)	7
Conversation timeout	0d 00h 00m 35s
Long Buffers (active)	1

- The items can be filtered. For an example, see [Filtering Services](#).


The screenshot shows the 'Service' monitor in webMethods EntireX 8.2. The left pane displays a tree view of the system components, with 'Service' selected. The right pane shows a table of service statistics.

Class/Server/Service	Deregister Service	Active servers	Attach managers	Active conv
SAG/ETBCIS/INFO		1	0	1
SAG/ETBCIS/USER-INFO		1	0	0
SAG/ETBCIS/CMD		1	0	0
SAG/ETBCIS/PARTICIPANT-SHUTDOWN		1	0	0
SAG/ETBCIS/SECURITY-CMD		1	0	0
SAG/ETBCIS/RPCCIS		1	0	0
RPC/RPCCIS/CALLNAT		1	0	2

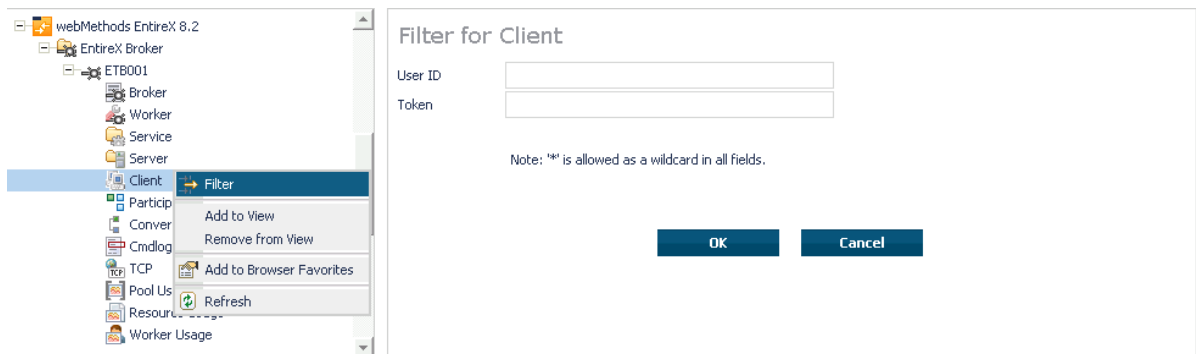
Filtering Clients

▶ To filter clients

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Click on the “+” sign of the broker name to be administered.

 **Note:** The broker must be running in order to display the Client subtree.


- 3 Select **Client**.
- 4 From the context menu, choose **Filter**.
- 5 Enter the data for **UserID** or **Token** that you would like to filter.
- 6 Choose **OK**.



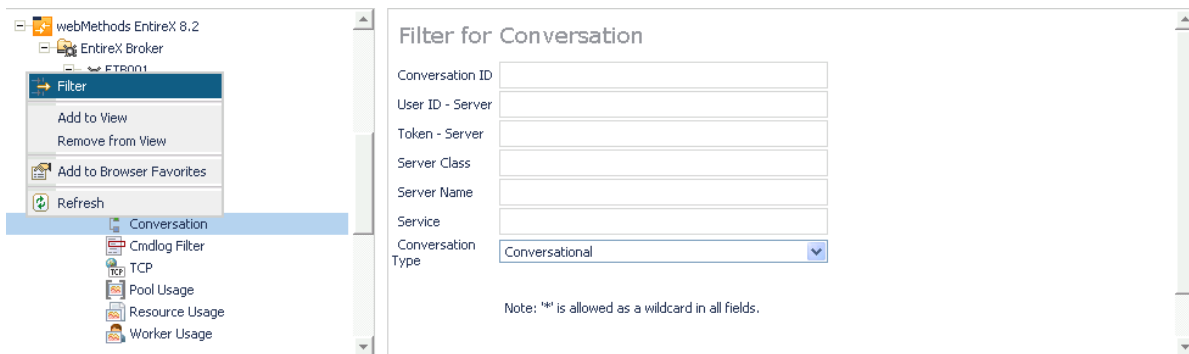
Filtering Conversations

▶ To filter conversations

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Click on the “+” sign of the broker name to be administered.

 **Note:** The broker must be running in order to display the Client subtree.


- 3 Select **Conversation**.
- 4 From the context menu, choose **Filter**.
- 5 Enter the data for **UserID** or **Token** that you would like to filter.
- 6 Choose **OK**.



Filtering the User

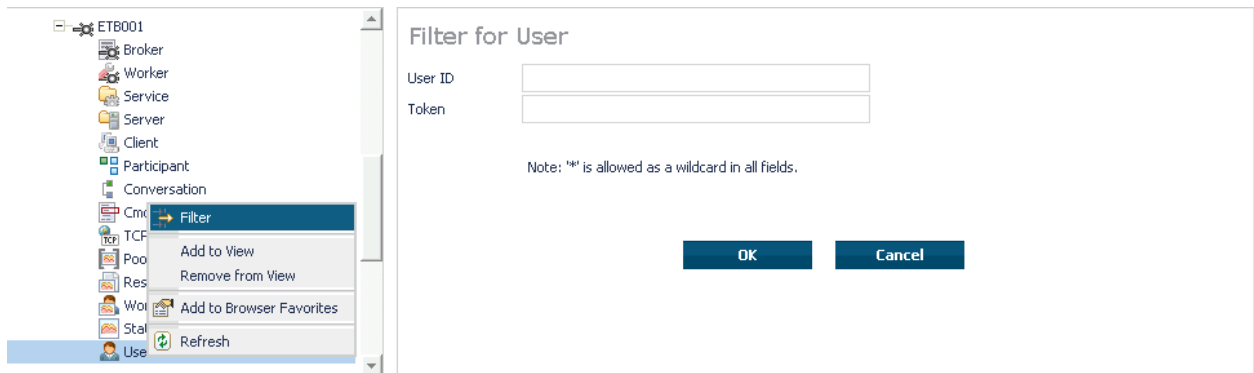
▶ To filter the user

- 1 Select the **EntireX Broker** node below the **EntireX** node in System Management.
- 2 Select the Broker instance on which the user is present.

 **Note:** The broker must be running in order to display the User subtree.

- 3 Select the user.
- 4 From the context menu, choose **Filter**.


- 5 Enter the data for User ID and Token that you would like to filter.
- 6 Choose **OK**.



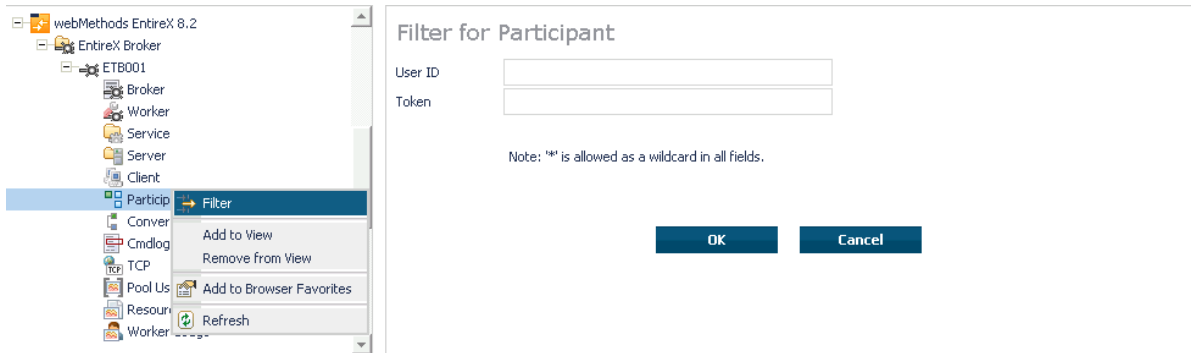
Filtering Participants

▶ **To filter participants**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Click on the “+” sign of the broker name to be administered.

 **Note:** The broker must be running in order to display the Client subtree.


- 3 Select **Participant**.
- 4 From the context menu, choose **Filter**.
- 5 Enter the data for **UserID** or **Token** that you would like to filter.
- 6 Choose **OK**.



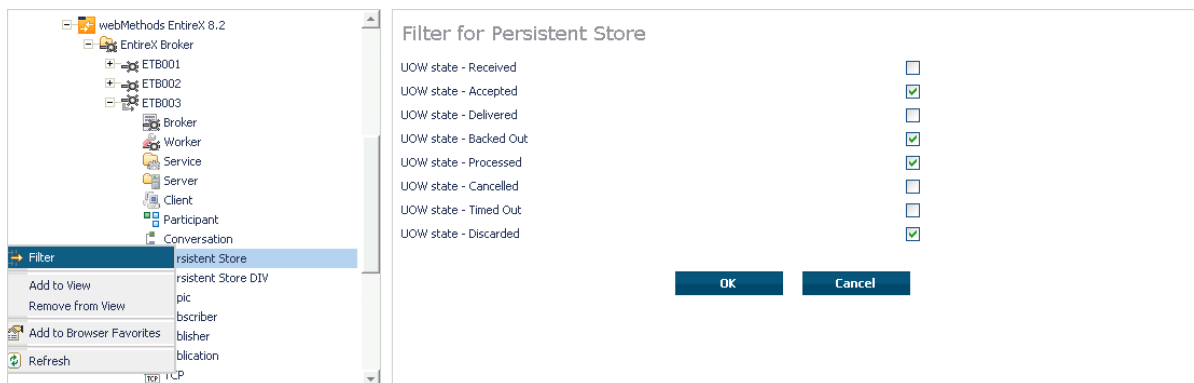
Filtering the Persistent Store

▶ To filter the persistent store

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the unit of work is present. The persistent store attributes (such as PSTORE, PSTORE-TYPE, STORE, DEFERRED, and UWSTATP etc.) must be configured and the broker must be running in order to display the **Persistent Store**.
- 3 Select the **Persistent Store** node to display a summary list of units of work.

 **Note:** A message box will pop up if the table is larger than 3,000 rows. You may prefer to apply a filter to your UOW table. See the filter command in the command menu. It might take several minutes to display all of the contents if you choose not to use the filter.


- 4 Choose **Filter**.
- 5 Click the check boxes for **Received**, **Accepted**, **Delivered**, **Backed Out**, **Processed**, **Cancelled**, **Timed Out** or **Discarded** that you would like to filter.
- 6 Choose **OK**.



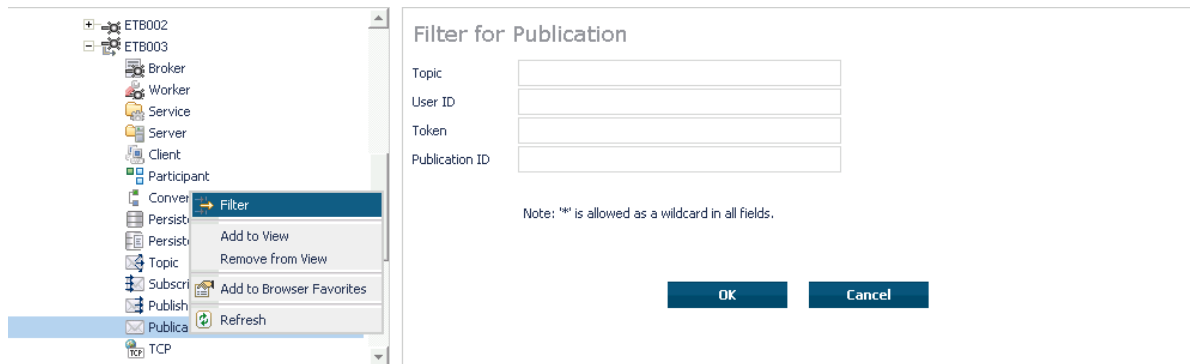
Filtering the Publication

▶ **To filter the publication**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the Broker instance on which the publication is present.

 **Note:** Pub/Sub must be enabled in the Broker attribute file, a license file for Pub/Sub must be installed, the Broker must be running, and a user must be published for a topic in order to display the data for the publication.


- 3 Select **Publication**.
- 4 From the context menu, choose **Filter**.
- 5 Enter the data for **Topic**, **User ID** or **Token** and **Publication ID**.
- 6 Choose **OK**.



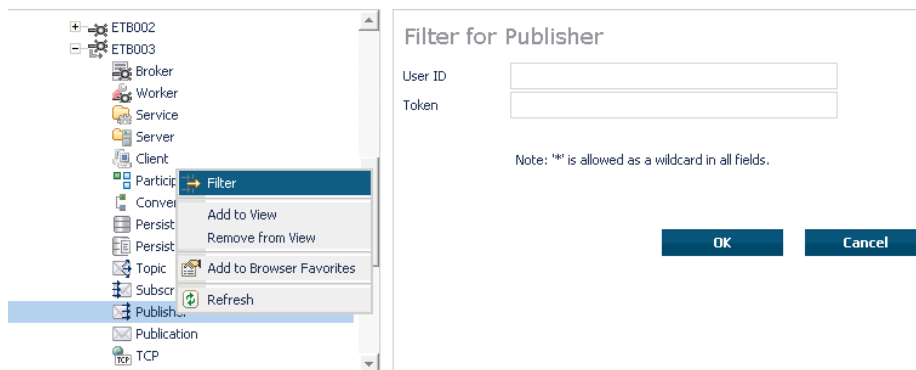
Filtering the Publisher

▶ To filter the publisher

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the Broker instance on which the publisher is present.

 **Note:** Pub/Sub must be enabled in the Broker attribute file, a license file for Pub/Sub must be installed, the Broker must be running, and a user must be published for a topic in order to display the data for the publisher.


- 3 Select **Publisher**.
- 4 From the context menu, choose **Filter**.
- 5 Enter the data for **User ID** and **Token** that you would like to filter.
- 6 Choose **OK**.



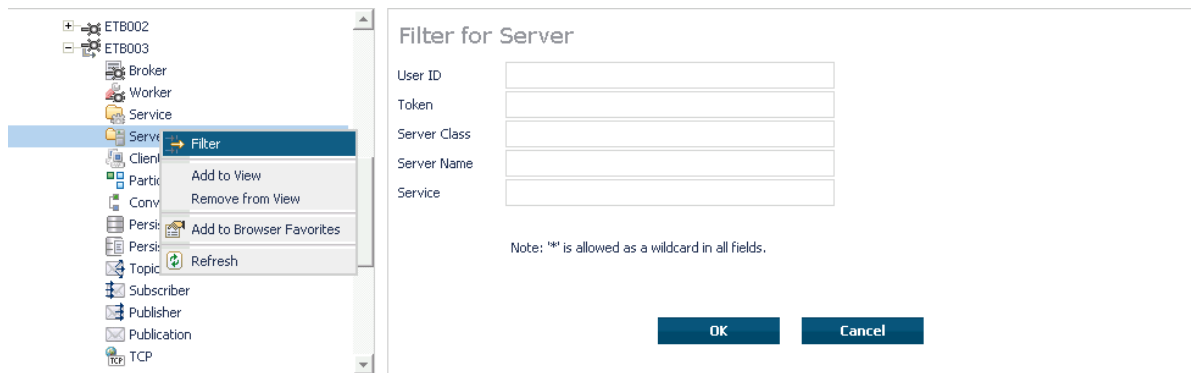
Filtering Servers

▶ **To filter servers**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Click on the “+” sign of the broker name to be administered.

 **Note:** The broker must be running in order to display the Server subtree.


- 3 Select **Server**.
- 4 From the context menu, choose **Filter**.
- 5 Enter the data for **UserID,Token,Server Class,Server Name** or **Service**.
- 6 Choose **OK**.



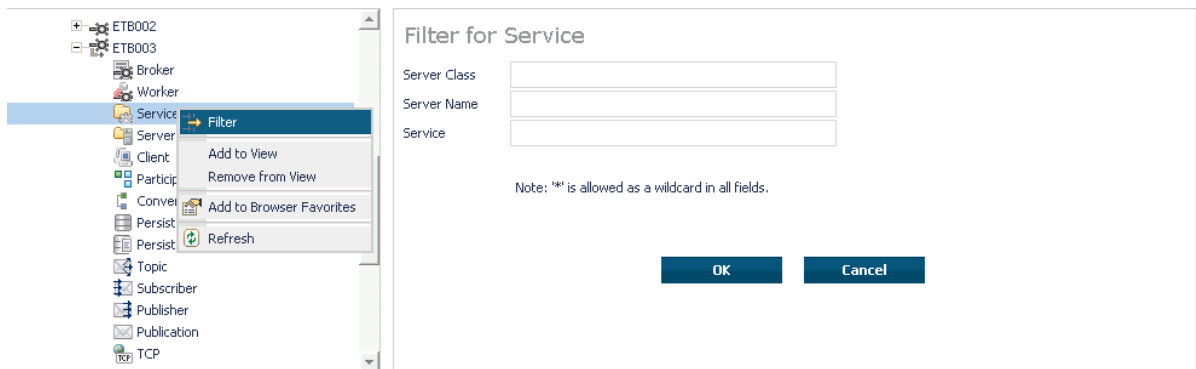
Filtering Services

▶ To filter services

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Click on the “+” sign of the broker name to be administered.


 **Note:** The broker must be running in order to display the Service subtree.

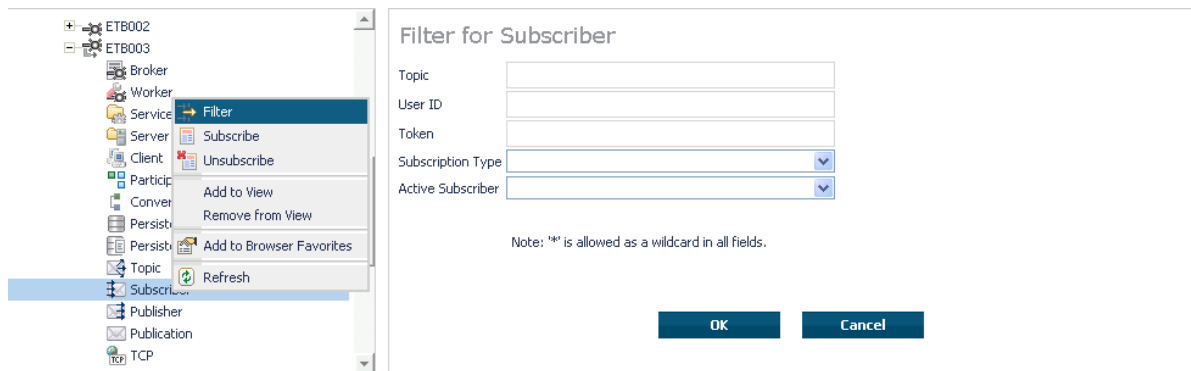
- 3 Select **Service**.
- 4 From the context menu, choose **Filter**.
- 5 Enter the data for **Server Class**, **Server Name** and **Service**.
- 6 Choose **OK**.



Filtering the Subscriber

▶ **To filter the subscriber**


- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the Broker instance on which the subscriber is present.
 **Note:** Pub/Sub must be enabled in the Broker attribute file, a license file for Pub/Sub must be installed, the Broker must be running, and a user must be subscribed to a topic in order to display the data for the subscriber.
- 3 Select **Subscriber**.
- 4 From the context menu, choose **Filter**.
- 5 Enter the data for **Topic, User ID, Token**; select **Subscription Type, Active Subscriber** and **Swapped Out** that you would like to filter.
- 6 Choose **OK**.



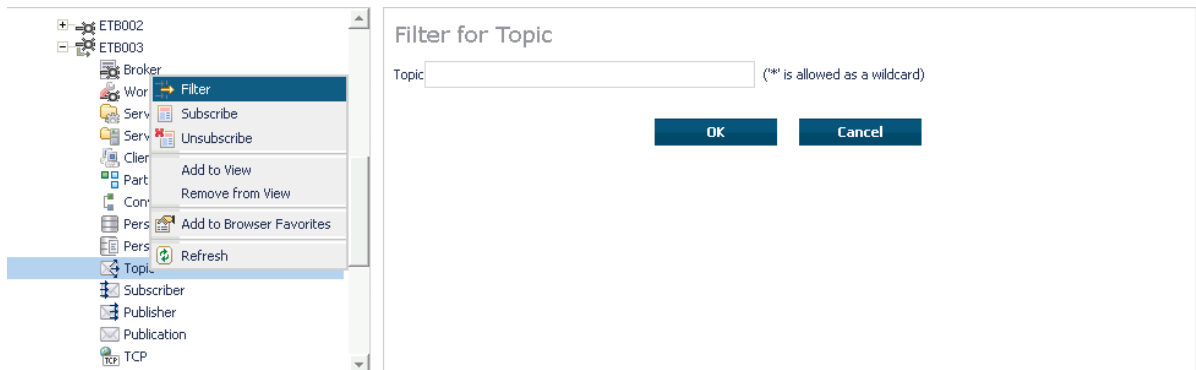
Filtering the Topic

▶ To filter the topic

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the Broker instance on which the topic is present.

 **Note:** Pub/Sub must be enabled in the Broker attribute file, a license file for Pub/Sub must be installed, the Broker must be running, and a user must be subscribed to a topic in order to display the data for the topic.

- 3 Select **Topic**.
- 4 From the context menu, choose **Filter**.
- 5 Enter the data for the **Topic** that you would like to filter.
- 6 Choose **OK**.



9

Using the Broker Command Service with SMH

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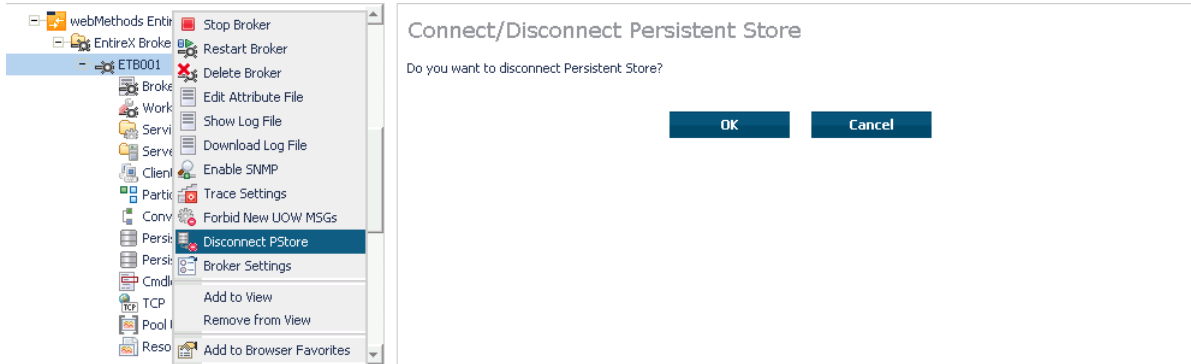
Connecting/Disconnecting Persistent Store

▶ **To connect or disconnect a Persistent Store**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance to be administered.
- 3 To connect a persistent store, select **Connect PStore**.
- 4 To disconnect a persistent store, select **Disconnect PStore**.

As a result, a confirmation screen will appear.

- 5 Choose **OK** or **Cancel**.



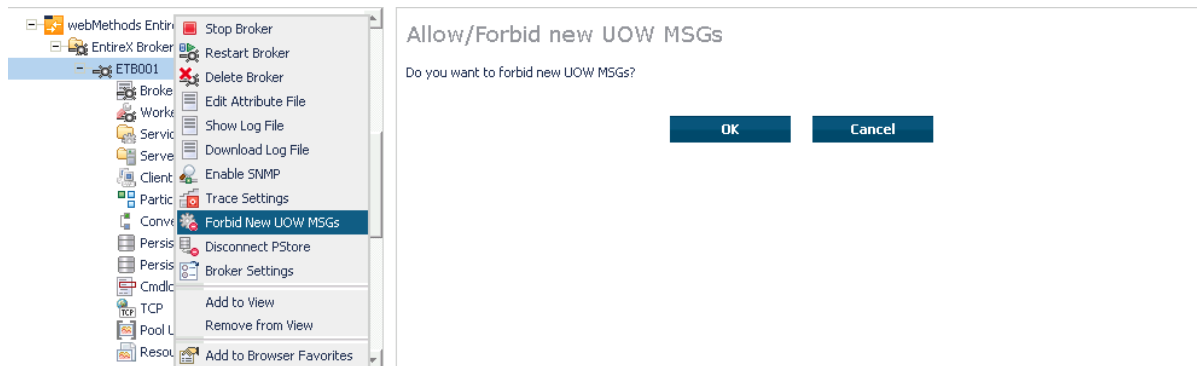
Allowing and Forbidding new UOW Messages

▶ To allow or forbid a Broker instance to accept new unit-of-work messages

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance to be administered.
- 3 To allow new unit-of-work messages, select **Allow new UOW MSGs**.
- 4 To forbid new unit-of-work messages, select **Forbid new UOW MSGs**.

As a result, a confirmation screen will appear.

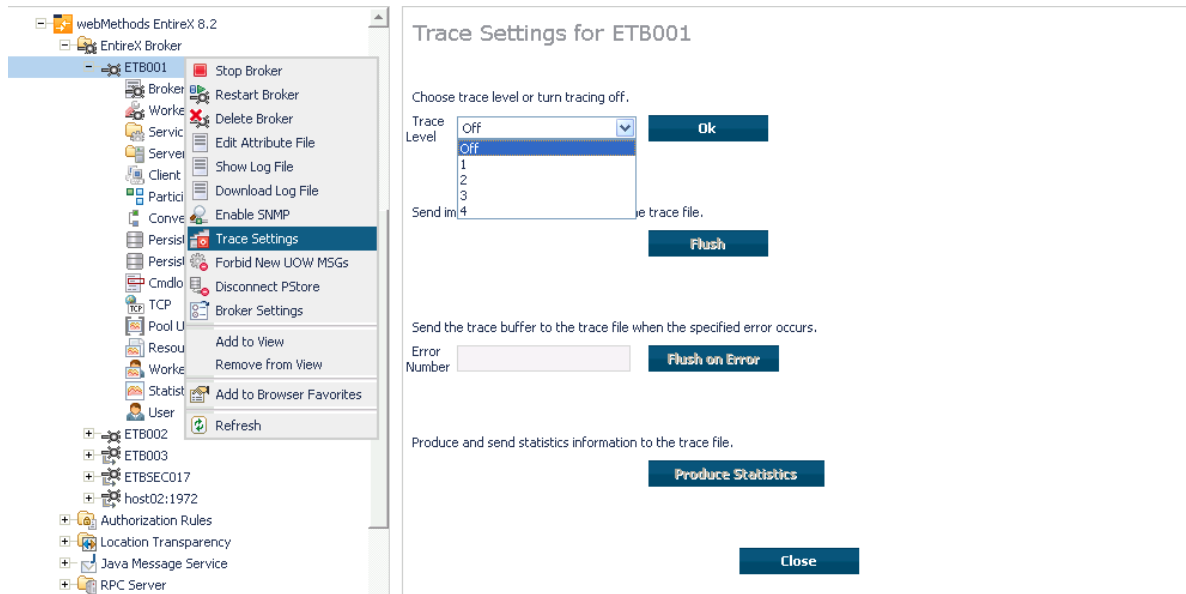
- 5 Choose **OK** or **Cancel**.



Setting a Broker Instance's Trace Level

▶ To set a broker instance's trace level

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance to be administered.
- 3 Choose **Trace Settings**.
- 4 Select a **Trace Level** between 1 and 4 or off.
- 5 Choose **OK**.



Flushing a Broker Instance's Trace Buffer

► To flush a broker instance's trace buffer

- 1 Select the **EntireX Broker** node below the **EntireX** node in **System Management**.
- 2 Select the broker instance to be administered.
- 3 Choose **Trace Settings**.
- 4 **Trace Level** must be between 1 and 4. Press **Flush** to confirm.

Flushing a Broker Instance's Trace Buffer on Error

► To flush a broker instance's trace buffer

- 1 Select the **EntireX Broker** node below the **EntireX** node in **System Management**.
- 2 Select the broker instance to be administered.
- 3 Choose **Trace Settings**.
- 4 **Trace Level** must be between 1 and 4. Enter a number between 1 and 9999 in the **Error Number** field and press **Flush on Error**.

Producing Statistics of a Broker Instance

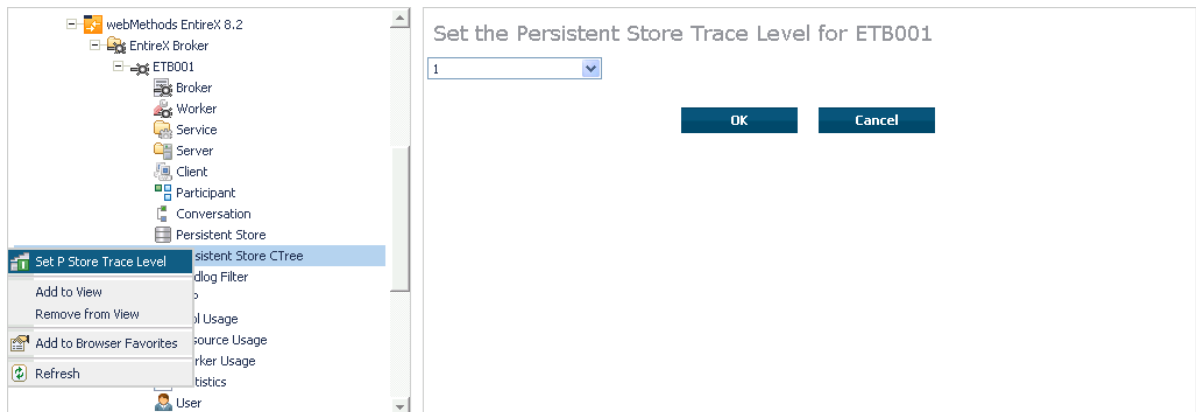
▶ To produce statistics of a broker instance

- 1 Select the **EntireX Broker** node below the **EntireX** node in **System Management**.
- 2 Select the broker instance to be administered.
- 3 Choose **Trace Settings**.
- 4 **Trace Level** must be between 1 and 4. Press **Produce Statistics**.

Setting the Persistent Store Trace Level

▶ To set the persistent store trace level

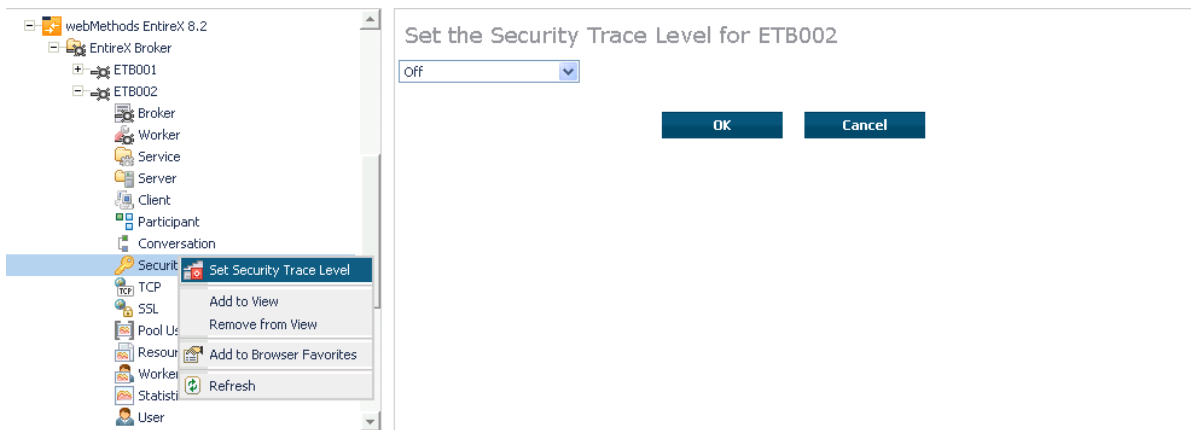
- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance to be administered.
- 3 Select a subnode of **Persistent Store** (either **Persistent Store ADA** or **Persistent Store CTree**).
- 4 Choose **Set Trace Level**.
- 5 Select a **Trace Level** between 1 and 4 or off.
- 6 Choose **OK**.



Setting the Security Trace Level

▶ **To set the security trace level**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance to be administered.
- 3 Select **Security**.
- 4 Set the security trace level by selecting a value between 1 and 4 in the **Set the Trace Level** box.
- 5 Choose **OK**.



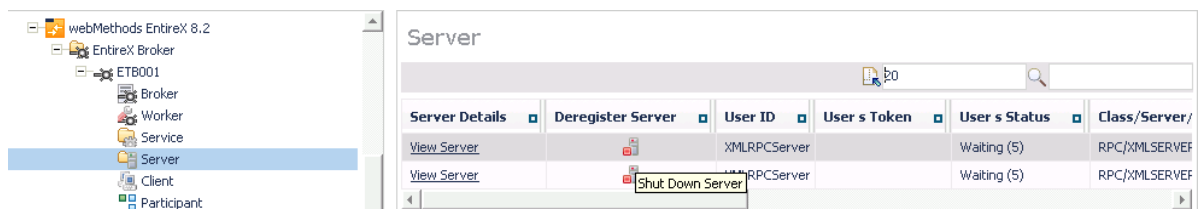
Deregistering a Server

▶ To deregister a server

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the server is running.
- 3 Select the **Server** node to display a summary list of servers.
- 4 From the column **Deregister Server**, choose icon **Shut Down Server**.
- 5 Choose the deregistration mode.

For deregister immediately, a server process will only be terminated if the server status is wait.

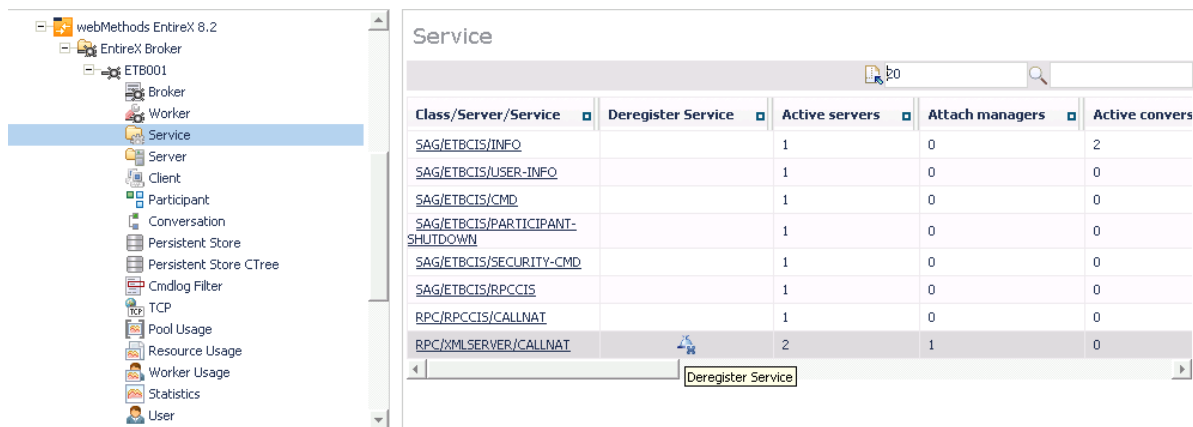
- 6 Confirm the deregistration by choosing **OK**.



Deregistering a Service

▶ To deregister a service


- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the server is running.
- 3 Select the Service node to display a summary list of servers.
- 4 From the column **Deregister Service**, choose icon **Deregister Service**.
- 5 Choose the deregistration mode.
- 6 Confirm the deregistration by choosing **OK**.



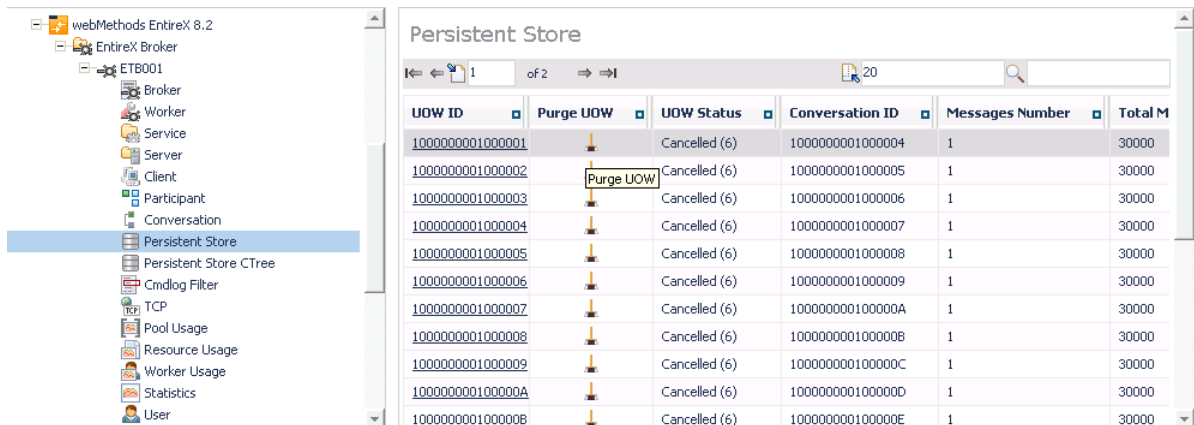
Purging Unit(s) of Work

▶ To purge a unit of work

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the unit of work is present.
- 3 Select the **Persistent Store** node to display a summary list of units of work.

 **Note:** A message box will pop up if the table is larger than 3,000 rows. You may prefer to apply a filter to your UOW table. See the filter command in the command menu. It might take several minutes to display all of the contents if you choose not to use the filter.

- 4 Choose **Purge**.
- 5 Choose **OK**.




The screenshot shows the webMethods EntireX 8.2 interface. On the left is a tree view with 'Persistent Store' selected. The main window displays a table titled 'Persistent Store' with the following columns: UOW ID, Purge UOW, UOW Status, Conversation ID, Messages Number, and Total M. The table contains 10 rows of data, all with a status of 'Cancelled (6)'. A tooltip 'Purge UOW' is visible over the 'Purge UOW' column of the second row.

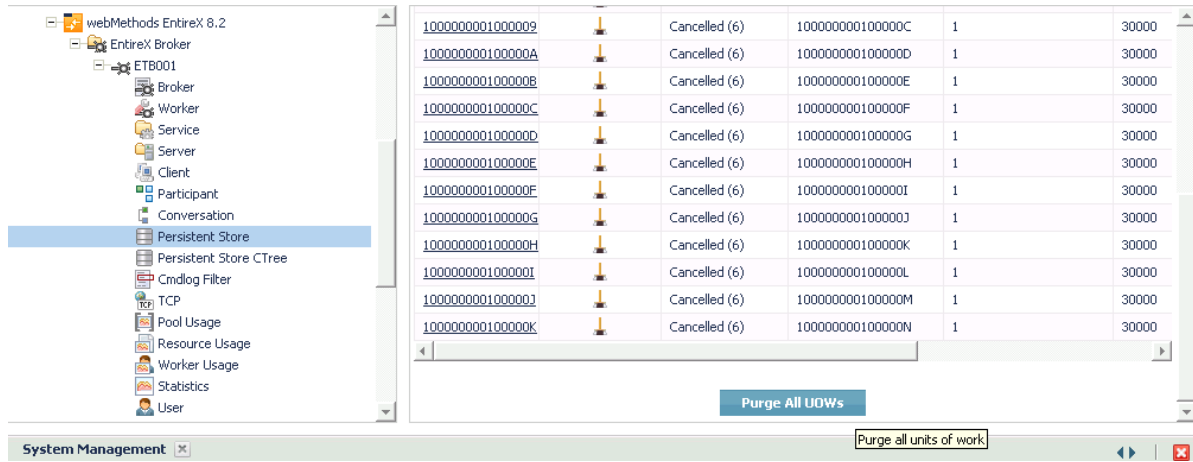
UOW ID	Purge UOW	UOW Status	Conversation ID	Messages Number	Total M
1000000001000001		Cancelled (6)	1000000001000004	1	30000
1000000001000002		Cancelled (6)	1000000001000005	1	30000
1000000001000003		Cancelled (6)	1000000001000006	1	30000
1000000001000004		Cancelled (6)	1000000001000007	1	30000
1000000001000005		Cancelled (6)	1000000001000008	1	30000
1000000001000006		Cancelled (6)	1000000001000009	1	30000
1000000001000007		Cancelled (6)	100000000100000A	1	30000
1000000001000008		Cancelled (6)	100000000100000B	1	30000
1000000001000009		Cancelled (6)	100000000100000C	1	30000
100000000100000A		Cancelled (6)	100000000100000D	1	30000
100000000100000E		Cancelled (6)	100000000100000E	1	30000

▶ To purge all units of work

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the units of work are present.
- 3 Select the **Persistent Store** node to display a summary list of units of work.

 **Note:** A message box will pop up if the table is larger than 3,000 rows. You may prefer to apply a filter to your UOW table. See the filter command in the command menu. It might take several minutes to display all of the contents if you choose not to use the filter.

- 4 Choose **Purge All UOWs** at the bottom of the table. A confirmation message will appear.
- 5 Choose **OK** or **Cancel**.




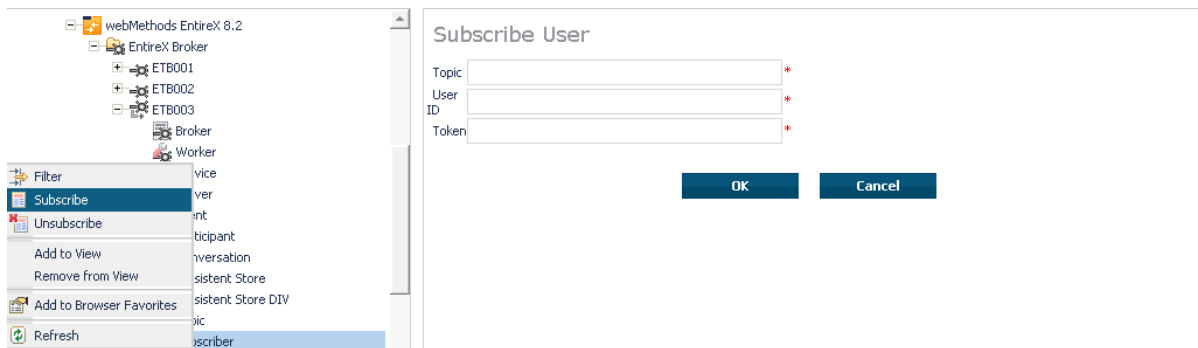
All units of work will be purged. The number of purged UOWs is reported in a screen similar to the one below.



Subscribing a User


▶ To subscribe a user

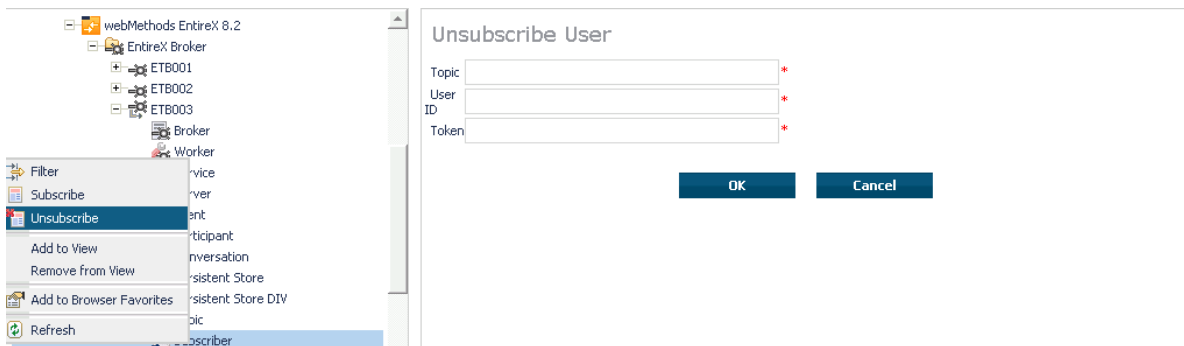
- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the Broker instance on which the topic (or subscriber) is present.
 -  **Note:** Pub/Sub must be enabled in the Broker attribute file, a license file for Pub/Sub must be installed, and the Broker must be running in order to display the topic (or subscriber).
- 3 Select **Topic** (or **Subscriber**).
- 4 From the context menu, choose **Subscribe**.
- 5 If you are on the **Topic** node, enter the data for **User ID** and **Token**; if you are on the **Subscriber** node, specify the topic that you would like to subscribe to.
- 6 Choose **OK**.



Unsubscribing a User

▶ **To unsubscribe a user**


- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the Broker instance on which the topic (or subscriber) is present.
 **Note:** Pub/Sub must be enabled in the Broker attribute file, a license file for Pub/Sub must be installed, and the Broker must be running in order to display the topic (or subscriber).
- 3 Select **Topic** (or **Subscriber**).
- 4 From the context menu, choose **Unsubscribe**.
- 5 If you are on the **Topic** node, enter the data for **User ID** and **Token**; if you are on the **Subscriber** node, specify the topic that you would like to unsubscribe from.
- 6 Choose **OK**.



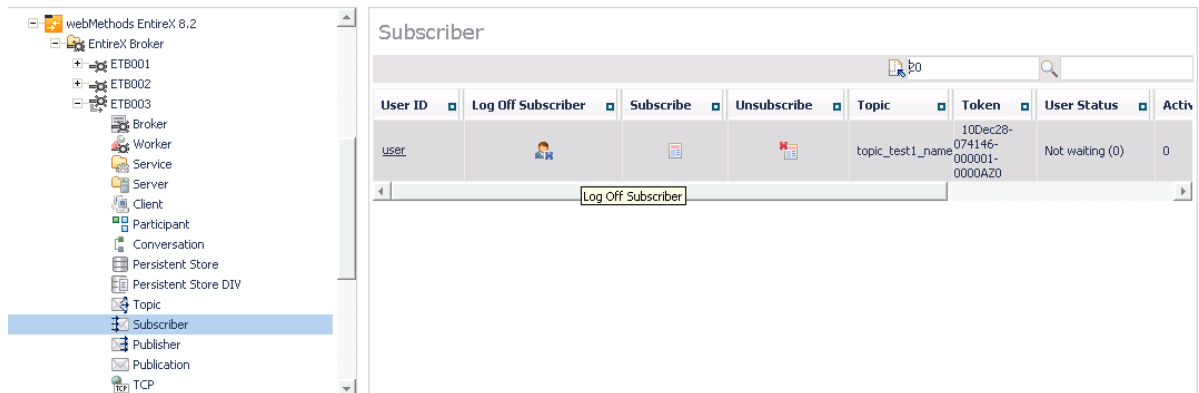
Logging Off a Subscriber

▶ To log off a subscriber

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the Broker instance on which the subscriber is present.

 **Note:** Pub/Sub must be enabled in the Broker attribute file, a license file for Pub/Sub must be installed, the Broker must be running, and a user must be subscribed to a topic in order to display the data for the subscriber.


- 3 Select **Subscriber**.
- 4 From the context menu, choose **Logoff**.
- 5 Choose the logoff mode.
- 6 Choose **OK**.



Logging Off a Publisher

▶ To log off a publisher

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the Publisher is present.

 **Note:** Pub/Sub must be enabled in the broker attribute file, a license file for Pub/Sub must be installed, the broker must be running, and a user must be published from a topic in order to display the data for the Publisher.

- 3 Select **Publisher**.
- 4 Choose **Logoff**.
- 5 Choose the logoff mode.
- 6 Choose **OK**.
- 7 After a Publisher is shut down successfully, it will be removed from the list.

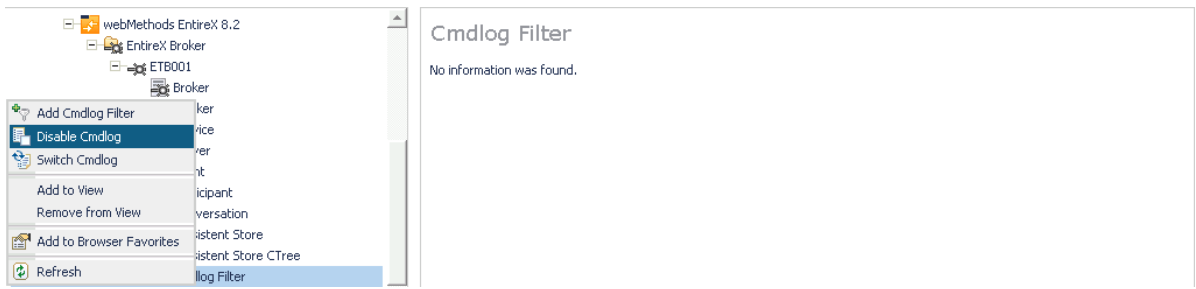


Enabling/Disabling Cmdlog

▶ To enable/disable cmdlog

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the Cmdlog filter is present. Cmdlog must be enabled in the broker attribute file and the broker must be running.
- 3 From the context menu, choose **Cmdlog Filter**.

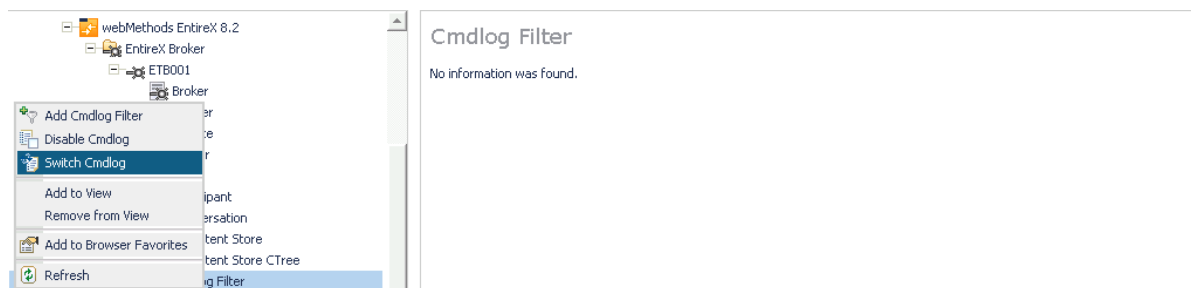
4 Choose **Enable Cmdlog** or **Disable Cmdlog**.



Switching Cmdlog

▶ **To switch cmdlog**

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the Cmdlog filter is present. Cmdlog must be enabled in the broker attribute file and the broker must be running.
- 3 From the context menu, choose **Cmdlog Filter**.
- 4 Choose **Switch Cmdlog**.



Adding Cmdlog Filter

▶ To add a cmdlog filter

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the Cmdlog filter is present. Cmdlog must be enabled in the broker attribute file and the broker must be running.
- 3 From the context menu, choose **Cmdlog Filter**.
- 4 Choose **Add Cmdlog Filter**.
- 5 Enter the data for user ID and Class/Server/Service or Topic you would like to filter.
- 6 Choose **OK** to add a Cmdlog filter to the list.



Enabling/Disabling Cmdlog Filter

▶ To enable/disable a cmdlog filter

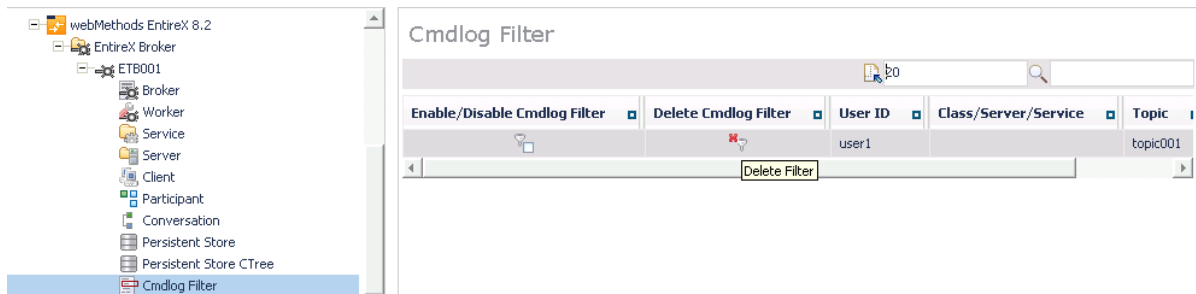
- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the Cmdlog filter is present. Cmdlog must be enabled in the broker attribute file and the broker must be running.
- 3 From the context menu, choose **Cmdlog Filter**.
- 4 Choose **Enable Cmdlog Filter** or **Disable Cmdlog Filter**.



Deleting Cmdlog Filter

▶ To delete a cmdlog filter

- 1 Select the **EntireX Broker** node below the EntireX node in **System Management**.
- 2 Select the broker instance on which the Cmdlog filter is present. Cmdlog must be enabled in the broker attribute file and the broker must be running.
- 3 From the context menu, choose **Cmdlog Filter**.
- 4 Choose **Delete Cmdlog Filter** to remove a Cmdlog filter from the list.



10

Configuring Broker for Internationalization

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It is assumed that you have read the document *Internationalization with EntireX* and are familiar with the various internationalization approaches described there.

This chapter explains in detail how to configure the broker for the various internationalization approaches, how to write a translation user exit and how to write a SAGTRPC user exit.

See also *What is the Best Internationalization Approach to use?* under *Introduction to Internationalization*

Configuring Translation

▶ To configure translation

- In the Broker attribute file, set the service-specific or topic-specific broker attribute TRANSLATION to SAGTCHA as the name of the translation routine. Example:

```
TRANSLATION=SAGTCHA
```

Configuring Translation User Exits

▶ To configure translation user exits

As a prerequisite, the user-written translation routine DLL must be accessible to the Broker worker threads.

- 1 Copy the user-written translation routine DLL into the EntireX *bin* folder.
- 2 In the Broker attribute file, set the service-specific or topic-specific broker attribute `TRANSLATION` to the name of the user-written translation routine. Example:

```
TRANSLATION=MYTRANS
```

or

1. Place the user-written translation routine DLL in a folder of your choice. Spaces in the path name are not allowed.
2. In the Broker attribute file, set the service-specific or topic-specific broker attribute `TRANSLATION` to the full path name of the folder of the user-written translation routine. Example:

```
TRANSLATION="C:\MyDir\MyTrans\MyTrans.dll"
```

Configuring ICU Conversion

▶ To configure ICU conversion

- 1 In the Broker attribute file, set the service-specific or topic-specific broker attribute `CONVERSION`. Examples:

- ICU Conversion with SAGTCHA for *ACI-based Programming*:

```
CONVERSION=(SAGTCHA,TRACE=1,OPTION=SUBSTITUTE)
```

- ICU Conversion with SAGTRPC for *RPC-based Components and Reliable RPC*:

```
CONVERSION=(SAGTRPC,TRACE=2,OPTION=STOP)
```

We recommend always using SAGTRPC for RPC data streams. *Conversion with Multibyte, Double-byte and other Complex Codepages* will always be correct, and *Conversion with Single-byte Codepages* is also efficient because SAGTRPC detects single-byte codepages automatically. See *Conversion Details*.

- 2 Optionally configure a `CONVERSION OPTION` to tune error behavior to meet your requirements; see *OPTION Values for Conversion*.
- 3 For the Broker attribute, check if ICU conversion is possible, that is, the attribute `ICU-CONVERSION` is either
 - not defined, its default is YES
 - set to YES

▶ To configure locale string defaults (optional)

- If the broker's locale string defaults do not match your requirements (see *Broker's Locale String Defaults* under *Locale String Mapping* in the internationalization documentation), we recommend you assign suitable locale string defaults for your country and region, see the respective attribute in *Codepage-specific Attributes* (`DEFAULTS=CODEPAGE`) under *Broker Attributes* in the platform-independent administration documentation for how to customize the broker's locale string defaults.

▶ To customize mapping of locale strings (optional)

- If the built-in locale string mapping mechanism does not match your requirements, you can assign specific codepages to locale strings. See *Broker's Built-in Locale String Mapping* under *Locale String Mapping* in the internationalization documentation and `locale-string` for information on customizing the mapping of locale strings to codepages.

Configuring SAGTRPC User Exits

The user-written SAGTRPC user exit DLL must be accessible to the Broker worker threads.

▶ To configure SAGTRPC user exits

- 1 Copy the user-written SAGTRPC user exit DLL into the EntireX *bin* folder.
- 2 In the Broker attribute file, set the service-specific or topic-specific broker attribute `CONVERSION` to the name of your SAGTRPC user exit. Example:

```
CONVERSION=(MYRPC,TRACE=1)
```

or

1. Place the user-written translation routine DLL in a folder of your choice. Spaces in the path name are not allowed.
2. In the Broker attribute file, set the service-specific or topic-specific broker attribute `CONVERSION` to the full path name of the folder of the SAGTRPC user exit. Example:

```
CONVERSION="C:\MyDir\MyTrans\MyRpc.dll"
```

▶ To configure locale string defaults

- If the broker's locale string defaults do not match your requirements, we recommend you assign suitable locale string defaults for your country and region. See the appropriate attribute under *Codepage-specific Attributes* (`DEFAULTS=CODEPAGE`) under *Broker Attributes* in the platform-independent administration documentation for information on customizing broker's locale string defaults, and also *Locale String Mapping* in the internationalization documentation.

▶ To customize mapping of locale strings

- If the broker's built-in locale string mechanism does not match your requirements, you can assign specific codepages to locale strings. See *Broker's Built-in Locale String Mapping* under *Locale String Mapping* in the internationalization documentation and the appropriate attribute under *Codepage-specific Attributes* (`DEFAULTS=CODEPAGE`) under *Broker Attributes* in the platform-independent administration documentation for information on customizing broker's locale string defaults.

Writing Translation User Exits

This section covers the following topics:

- [Introduction](#)
- [Structure of the TRAP Control Block](#)

- Using the TRAP Fields

Introduction

EntireX Broker provides an interface to enable user-written translation routines in the programming language C. It contains three parameters:

- The address of the TRAP control block (TRAP = Translation Routine / Area for Parameters).
- The address of a temporary work area. It is aligned to fullword / long integer boundary (divisible by 4). The work area can only be used for temporary needs and is cleared after return.
- A fullword (long integer) that contains the length of the work area.



Note: Names for user-written translation routines starting with "SAG" are reserved for Software AG usage and must not be used, e.g. "SAGTCHA" and "SAGTRPC".

Structure of the TRAP Control Block

The C structure TR_TRAP covers the layout of the control block.

```
typedef struct _TR_TRAP /* I / 0 */
{
    unsigned long tr_type; /* TRAP type: TRAP_TYPE inp */
#define TR_TYPE 2 /* TRAP type ETB 121 */
    long tr_ilen; /* Input buffer length inp */
    unsigned char *tr_ibuf; /* Ptr to input buffer inp */
    long tr_olen; /* Output buffer length inp */
    unsigned char *tr_obuf; /* Ptr to output buffer inp */
    long tr_dlen; /* Len of data returned: out */
    /* Minimum of tr_ilen */
    /* and tr_olen */
    unsigned long tr_shost; /* Senders host inp */
#define TR_LITTLE_ENDIAN 0 /* little endian */
#define TR_BIG_ENDIAN 1 /* big endian */
    unsigned long tr_scode; /* Senders character set inp */
#define SEBCIBM ((1L << 5)|(1L << 1)) /* 0x22 EBCDIC (IBM) */
#define SEBCSNI ((1L << 6)|(1L << 1)) /* 0x42 EBCDIC (SNI) */
#define SA88591 (1L << 7) /* 0x80 ASCII */
    unsigned long tr_rhost; /* Receivers host (see tr_shost) inp */
    unsigned long tr_rcode; /* Receivers char set (see tr_scode) inp */
    unsigned long tr_bhost; /* BROKER host (see tr_shost) inp */
    unsigned long tr_bcode; /* BROKER char set (see tr_scode) inp */
    unsigned long tr_senva; /* Senders ENVIRONMENT field set: inp */
#define OFF 0 /* ENVIRONMENT field not set */
#define ON 1 /* ENVIRONMENT field set */
    unsigned long tr_renva; /* Receivers ENVIRONMENT field set: inp */
    /* see tr_senva */
#define S_ENV 32 /* size of ENVIRONMENT field */
    char tr_senv[S_ENV]; /* Senders ENVIRONMENT field inp */
}
```

```
char      tr_renv[S_ENV]; /* Receivers ENVIRONMENT field inp */
} TR_TRAP;
```

The file *usrtcha.c* is an example of the translation user exit. It is delivered in the Broker user exit directory. See *Directories as Used in EntireX* in the general administration documentation.

Using the TRAP Fields

The `tr_dlen` must be supplied by the user-written translation routine. It tells the Broker the length of the message of the translation. In our example its value is set to the minimum length of the input and output buffer.

All other TRAP fields are supplied by the Broker and must not be modified by the user-written translation routine.

The incoming message is located in a buffer pointed to by `tr_ibuf`. The length (not to be exceeded) is supplied in `tr_ilen`. The character set information from the send buffer can be taken from `tr_scode`.

The outgoing message must be written to the buffer pointed to by `tr_obuf`. The length of the output buffer is given in the field `tr_olen`. The character set is specified in `tr_rcode`. If the addresses given in `tr_ibuf` and `tr_obuf` point to the same location, it is not necessary to copy the data from the input buffer to the output buffer.

The environment fields `tr_senva` and `tr_renva` are provided to handle site-dependent character set information. For the SEND and/or RECEIVE functions, you can specify data in the ENVIRONMENT field of the Broker ACI control block. This data is translated into the codepage of the platform where EntireX Broker is running (see field `tr_bcode`) and is available to the `tr_senv` or `tr_renv` field in the TRAP control block. `tr_senva` or `tr_renva` are set to ON if environmental data is available.

The sample source `USRTCHA` contains a section to handle the ENVIRONMENT value `*NONE`. The translation will be skipped if `*NONE` is supplied by the sender or receiver. Any values given in the API field ENVIRONMENT must correspond to the values handled in the translation routine.

Writing SAGTRPC User Exits

This section covers the following topics:

- [Introduction](#)
- [Structure of the User Exit Control Block](#)
- [Using the User Exit Interface Fields](#)
- [Character Set and Codepage](#)

Introduction

EntireX Broker provides an interface to SAGTRPC user exit routines written in the programming language C. The interface contains three parameters:

- The address of the UE (user exit) control block.
- The address of a temporary work area. It is aligned to a fullword / long-integer boundary (divisible by 4). The work area can only be used temporarily and is cleared after return.
- A fullword (long integer) that contains the length of the work area.



Note: Names for conversion routines starting with "SAG" are reserved for Software AG usage and must not be used, e.g. "SAGTCHA" and "SAGTRPC".

Structure of the User Exit Control Block

The C structure UECB shows the layout of the user exit control block.

```
typedef struct _UECB
{
    unsigned long    eVersion;
#define USRTRPC_VERSION_1          1

    char            * pInputBuffer;
    unsigned long   uInputLen;
    char            * pOutputBuffer;
    unsigned long   uOutputLen;
    unsigned long   uReturnedLen;

    unsigned long   shost;
#define USRTRPC_LITTLE_ENDIAN 0    /* little endian */
#define USRTRPC_BIG_ENDIAN   1    /* big endian */

    unsigned long   scode;
#define USRTRPC_SEBCIBM ((1L << 5)|(1L << 1)) /* 0x22 EBCDIC (IBM) */
#define USRTRPC_SEBCSNI ((1L << 6)|(1L << 1)) /* 0x42 EBCDIC (SNI) */
#define USRTRPC_SA88591   (1L << 7) /* 0x80 ASCII */
}
```



```

    unsigned long        rhost;
/* see shost */
    unsigned long        rcode;
/* see scode */
    unsigned long        bhost;
/* see shost */
    unsigned long        bcode;
/* see scode */

    unsigned long        uCpSender;
    unsigned long        uCpReceiver;
    unsigned long        uCpBroker;

    char                  eFunction;
#define USRTRPC_FCT_CONVERT        'C'
#define USRTRPC_FCT_GETLENGTH     'L'

    char                  eDirection;
#define USRTRPC_DIR_SENDER_TO_BROKER    '1'
#define USRTRPC_DIR_SENDER_TO_RECEIVER  '2'
#define USRTRPC_DIR_BROKER_TO_RECEIVER  '3'

    char                  sFormat[2];
#define ERX_USERDATA        "01"    /* UserId, Lib, Pgm, etc. from Header
                                     (truncatable) */
#define ERX_METADATA        "02"    /* Header Data (non-truncatable) */
#define ERX_FRMTDATA        "03"    /* Format Buffer (non-truncatable) */
#define ERX_SB_ELEMENT      "04"    /* String Buffer */
#define ERX_VB_METADATA     "05"    /* Value Buffer Array Occurences,
                                     String Length */
#define ERX_PREVIEW        "99"    /* Previewing FB and VB, etc...
                                     /* Convert data lazy. Do not care on
                                     /* length changes and truncation.

#define ERX_FRMT_A          "A "    /* Data Type A
#define ERX_FRMT_AV         "AV"   /* Data Type AV
#define ERX_FRMT_B          "B "    /* Data Type B
#define ERX_FRMT_BV         "BV"   /* Data Type BV
#define ERX_FRMT_D          "D "    /* Data Type D
#define ERX_FRMT_F4         "F4"   /* Data Type F4
#define ERX_FRMT_F8         "F8"   /* Data Type F8
#define ERX_FRMT_I1         "I1"   /* Data Type I1
#define ERX_FRMT_I2         "I2"   /* Data Type I2
#define ERX_FRMT_I4         "I4"   /* Data Type I4
#define ERX_FRMT_K          "K "    /* Data Type K
#define ERX_FRMT_KV         "KV"   /* Data Type KV
#define ERX_FRMT_L          "L "    /* Data Type L
#define ERX_FRMT_N          "N "    /* Data Type N
#define ERX_FRMT_P          "P "    /* Data Type P
#define ERX_FRMT_T          "T "    /* Data Type T
#define ERX_FRMT_U          "U "    /* Data Type U
#define ERX_FRMT_UV         "UV"   /* Data Type UV

```

```
char          szErrorText[40];  
} UECB;
```

The file *usrtrpc.c* is an example of the SAGTRPC User Exit. It is delivered in the Broker User Exit Directory. See *Directories as Used in EntireX* in the general administration documentation.

Using the User Exit Interface Fields

The user exit provides two separate functions, `Convert` and `GetLength`. The field `eFunction` indicates the function to execute.

Errors

Both functions can send an error, using register 15 in the range 1 to 9999 to SAGTRPC together with an error text in the field `szErrorText`.

- A value of 0 returned in register 15 means successful response.
- Error 9999 is reserved for output buffer overflow. See [Convert Function](#).
- When an error occurs, the conversion of the message will be aborted and the error text will be sent to the receiver (client or server). The error is prefixed with the error class 1011. See *Message Class 1011 - User-definable SAGTRPC Conversion Exit* under *Error Messages and Codes*.

Example:

The user exit returns 1 in register 15 and the message “Invalid Function” in `szErrorText`. The receiver gets the error message 10110001 Invalid Function.

Convert Function

This function has to be executed when the contents of `eFunction` match the definition `USRTRPC_FCT_CONVERT`.

`uReturnedLen` must be supplied by SAGTRPC's user-written conversion exit. Its value must be set to the length of the output buffer.

All other interface fields are supplied by the Broker and must not be modified by SAGTRPC's user-written conversion exit.

The incoming data is located in a buffer pointed to by `pInputBuffer`. `uInputLen` defines the length.

The outgoing converted message must be written to the buffer pointed to by `pOutputBuffer`. The field `tr_olen` defines the maximum length available.

For variable length data such as AV and KV, an output buffer overflow can occur if the message size increases after conversion or the receiver's receive buffer is too small. In this case error 9999

“output buffer overflow” must be returned, which calls the *GetLength Function* for the remaining fields.

GetLength Function

The `GetLength` function evaluates the needed length of the output buffer after conversion. An actual conversion must not be performed. The length needed must be returned in the field `uOutputLen`.

The `GetLength` function is called for remaining fields after the `Convert` function returned the error 9999 “output buffer overflow”.

The purpose of this function is to evaluate the length needed by the receiver's receive buffer. This length is returned to the receiver in the ACI field `RETURN-LENGTH`. The receiver can then use the Broker ACI function `RECEIVE` with the option `LAST` together with a receive buffer large enough to reread the message.

Character Set and Codepage

The character-set information used is the same as in the user-written translation routine and is taken from `scode` (for the sender), `rcode` (for the receiver) and `bcode` (for the Broker). The character-set information depends on the direction information given in the field `eDirection`. See the following table:

<code>eDirection</code>	From Character Set	To Character Set
<code>USRTRPC_DIR_SENDER_TO_BROKER</code>	<code>scode</code>	<code>bcode</code>
<code>USRTRPC_DIR_SENDER_TO_RECEIVER</code>	<code>scode</code>	<code>rcode</code>
<code>USRTRPC_DIR_BROKER_TO_RECEIVER</code>	<code>bcode</code>	<code>rcode</code>

Alternatively, the codepage as derived from the locale string mapping process is provided in `uCpSender` (sender codepage), `uCpReceiver` (receiver codepage) and `uCpBroker` (Broker codepage), and can be used to find the correct conversion table. See the following table and also *Locale String Mapping* in the internationalization documentation.

<code>eDirection</code>	From Codepage	To Codepage
<code>USRTRPC_DIR_SENDER_TO_BROKER</code>	<code>uCpSender</code>	<code>uCpBroker</code>
<code>USRTRPC_DIR_SENDER_TO_RECEIVER</code>	<code>uCpSender</code>	<code>uCpReceiver</code>
<code>USRTRPC_DIR_BROKER_TO_RECEIVER</code>	<code>uCpBroker</code>	<code>uCpReceiver</code>

Software AG IDL Data Types to Convert

The field `sFormat` provides the SAGTRPC user-written conversion exit with the information on the IDL data types to convert. Each data type can be handled independently.

sFormat	Data to be converted	Notes
FMTA	IDL data type A	1, 3, 4
FMTAV	IDL data type AV	4, 5
FMTB	IDL data type B	1, 2, 7
FMTBV	IDL data type BV	1, 2, 7
FMTD	IDL data type D	1, 2, 7
FMTF4	IDL data type F4	1, 2, 7
FMTF8	IDL data type F8	1, 2, 7
FMTI1	IDL data type I1	1, 2, 7
FMTI2	IDL data type I2	1, 2, 7
FMTI4	IDL data type I4	1, 2, 7
FMTK	IDL data type K	1, 3, 4
FMTKV	IDL data type KV	4, 5
FMTL	IDL data type L	1, 2, 7
FMTN	IDL data type N	1, 2, 7
FMT P	IDL data type P	1, 2, 7
FMTT	IDL data type T	1, 2, 8
FMTU	IDL data type U	1, 2, 7
FMTUV	IDL data type UV	1, 2, 7
FMTUSER	RPC user data such as user ID, library, program...	1, 3, 4
FMTMETA	RPC metadata	1, 2, 7
FMTFB	RPC format buffer	1, 2, 7
FMTSB	RPC metadata variable length	4, 5, 7
FMPRE	Preview data	4, 6, 7



Notes:

1. Field length is constant.
2. The field content length must not increase or decrease during conversion. If this happens, the user exit should produce an error.
3. If the field content length *decreases* during the conversion, suitable padding characters (normally blanks) have to be used.
 If the field content length *increases* during conversion and exceeds the field length, the contents must be truncated or, alternatively, the conversion can be aborted and an error produced.

4. If the contents are truncated, character boundaries are the responsibility of the user exit. Complete valid characters after conversion have to be guaranteed. This may be a complex task for codepages described under *Conversion with Multibyte, Double-byte and other Complex Codepages*. For *Conversion with Single-byte Codepages* it is simple because the character boundaries are the same as the byte boundaries.
5. The field length can decrease or increase during the conversion up to the output buffer length. The new field length must be returned in `uReturnedLen`. If the output buffer in the `Convert` function is too small, error 9999 must be returned to the caller.
6. The field buffer should continue to be converted until the output buffer is full or the input buffer has been processed. If the field content length increases or truncations occur, no error should be produced. If the field content length decreases, there should be no padding. The new field length should simply be returned to the caller.
7. Codepages used for RPC data streams must meet several requirements. See *Codepage Requirements for RPC Data Stream Conversions* under *What is the Best Internationalization Approach to use?* under *Introduction to Internationalization*. If these are not met, the codepage cannot be used to convert RPC data streams.

▶ **To compile and link the SAGTRPC User Exit**

- See the *README.TXT* in the *Broker User Exit Directory* under *Directories as Used in EntireX* in the general administration documentation.

Building and Installing ICU Custom Converters

User-written ICU custom-converters can be used for *ACI-based Programming*, *RPC-based Components*, and *Reliable RPC*.

This section covers the following topics:

- [Writing a User-written ICU Converter](#)
- [Compiling a User-written ICU Converter](#)

- [Installing a User-written ICU Converter](#)

Writing a User-written ICU Converter

ICU uses algorithmic conversion, non-algorithmic conversion and combinations of both. See *ICU Conversion* under *Introduction to Internationalization*. Non-algorithmic converters defined by the UCM format are the easiest way to define user-written ICU converters. See *UCM Format* under *ICU Resources* under *Introduction to Internationalization*.

▶ To write a (non-algorithmic) user-written ICU converter

- Define the ICU converter file in UCM format using a text editor to meet your requirements.



Note: For further explanation of the UCM file format, see *ICU Resources* under *Introduction to Internationalization*.

Writing algorithmic and partially algorithmic converters can be complex. However, they can be installed into EntireX in the same way as the table-driven, non-algorithmic ones. A description of how to write algorithmic and partially algorithmic converters is beyond the scope of this documentation; please see the ICU documentation and other sources specified under *ICU Resources* under *Introduction to Internationalization*.

Compiling a User-written ICU Converter

▶ To compile the user-written ICU converter

- Compile the converter source files (extension *.ucm*) into binary converter files (extension *.cnv*) using the ICU tool `makeconv`. Example:

```
makeconv -v myebcdic.ucm
```



Note: EntireX delivers the ICU tool `makeconv` in the EntireX *bin* folder.

This produces a binary converter file named *myebcdic.cnv*.



Caution: The binary format "cnv" depends on the endianness (big/little endian) and character set family (ASCII/EBCDIC) of the computer where it is produced. Under Windows, little endian ASCII binary converter files are produced. If the broker is running under Windows, it is highly recommended to compile the converter source file(s) under Windows also, otherwise unpredictable result may occur.

Installing a User-written ICU Converter

▶ To install the user-written ICU converter

- 1 Check if the folder *Software AG* exists in the Windows local application data directory for all users. See *Application Data Directory* under *Directories as Used in EntireX* in the general administration documentation. If not, create the folder *Software AG*. Example:

```
C:\Documents and Settings\All Users\Application Data\Software AG
```

- 2 Check if the folder *icudt<icu-version>l* exists in the folder *Software AG* (see 1 above) in the Windows application data folder for all users. If not, create the folder *icudt<icu-version>l* where:

- *<icu-version>* is the ICU version used, for example "32".
- "l" stands for little-endian, example:

```
C:\Documents and Settings\All Users\Application Data\Software AG\icudt32l
```



Notes:

1. The folder and its naming are given by ICU standard. It is not invented by Software AG.
2. See the Release Notes to determine the ICU version used by the broker you are running and form the correct folder name - otherwise the user-written ICU converter will not be located.
3. There are also other approaches supported by ICU to locate converters. These approaches are (also) ICU version dependent. However, Software AG recommends the mechanism described above. See the ICU website for more information under *ICU Resources* under *Introduction to Internationalization*.
- 3 If the converter name is not sent as the locale string by your application, customize the mapping of locale strings by assigning the user-written ICU converter (codepage) to locale strings in the Broker attribute file, see *locale-string* for how to customize the mapping of locale strings to codepages. Example:

```
DEFAULTS=CODEPAGE
/* Customer-written ICU converter */
CP1140=myebcdic
CP0819=myascii
```

- 4 For the Broker attribute, check whether ICU conversion is possible, that is, the attribute *ICU-CONVERSION* is
 - not defined, its default is "YES"

- set to "YES"
- 5 For the Broker attribute, check whether use of ICU custom converters is possible, that is, the attribute `ICU-SET-DATA-DIRECTORY` is either
- not defined, its default is "YES"
 - (is) set to "YES"

11 Managing the Broker Persistent Store

- Implementing an Adabas Database as Persistent Store 168
- c-tree Database as Persistent Store 176
- Migrating the Persistent Store 177

The persistent store is used for storing unit-of-work messages and publish-and-subscribe data to disk. This means message and status information can be recovered after a hardware or software failure to the previous commit point issued by each application component.

Under Windows, the broker persistent store can be implemented with:

- the Adabas database of Software AG
- the c-tree (C) Copyright database of FairCom Corporation (R)



Note: If you were previously using the local file system of the machine where the Broker kernel executes, you will need to migrate to a supported persistent store. This persistent store option is no longer supported. To migrate your persistent store, please see the steps outlined in [Migrating the Persistent Store](#).

See also *Concepts of Persistent Messaging* in the general administration documentation.

Implementing an Adabas Database as Persistent Store

- [Introduction](#)
- [Adabas Persistent Store Parameters](#)
- [Configuring and Operating the Adabas Persistent Store](#)
- [Adabas DBA Considerations](#)

Introduction

EntireX provides an Adabas persistent driver. This enables Broker unit of work (UOW) messages and their status to be stored in an Adabas file. It is designed to work with Adabas databases under z/OS, UNIX, Windows, BS200/OSD and z/VSE, and can be used where the database resides on a different machine to Broker kernel. For performance reasons, we recommend using EntireX Broker on the same machine as the Adabas database.

Adabas Persistent Store Parameters

Parameters are supplied using the *Adabas-specific Attributes* (DEFAULTS=ADABAS) under *Broker Attributes* in the platform-independent administration documentation. See excerpt from the broker attribute file:

```

DEFAULTS=BROKER
STORE                = BROKER
PSTORE -TYPE        = ADABAS
PSTORE              = COLD

DEFAULTS=ADABAS
DBID                 = dbid
FNR                  = fnr

```

Configuring and Operating the Adabas Persistent Store

Selecting the Adabas Persistent Store Driver

The Adabas Persistent Store driver module is contained within the regular Broker load library or binaries directory. The module ADAPSI is activated by specifying the `PSTORE -TYPE` parameter as shown above.

Use the supplied script *persistence.fdu.bat* in the *bin* directory to create a persistent store file in your Adabas database. This script uses the Adabas FDT definition found in file *persistence.fdt* in the *etc* directory.

The script *persistence.fdu.bat* can be executed like this:

```
persistence.fdu.bat <dbid> <fnr>
```



Note: You can customize the supplied script and FDT file in accordance with your site requirements. See the *Adabas Utilities* manual where necessary, specifically *ADAFDU (File Definition Utility)*.

▶ To run the bat file

- 1 Ensure that you execute the bat file on the same machine that the target Adabas is running on. (The database can be either active or inactive at the time you execute it.)
- 2 Ensure that Adabas environment variables (such as `ACLDIR`, `ADATTOOLS`, `ADABIN` and `ADALNK`) are set up.
- 3 Set your working directory to the one where the bat and fdt files are located.
- 4 Execute the bat file, passing it two parameters. (The first one is the DBID, where persistent store file is to be created; the second is the file number.)
- 5 Option: If the DBID is less than 3 characters long, include leading zeros. For example:

```
persistence.fdu.bat 001 19
```

Result: Creation of file number 19 in database 1.

Defining an Adabas FDT for EntireX File

```
ADACMP FNDEF='01,WK,21,A,DE'  
ADACMP FNDEF='01,WJ,126,B,MU'  
ADACMP FNDEF='01,WI,126,B,DE,NU'  
ADACMP FNDEF='01,WL,96,A,DE,NU'  
ADACMP FNDEF='01,WP,96,A,DE,NU'
```

Restrictions

If a HOT start is performed, the Broker kernel must be executed on the same platform on which also the previous Broker executed. This is because some portions of the persistent data are stored in the native character set and format of the Broker kernel. It is also necessary to start Broker with the same Broker ID as the previous Broker executed.

If a COLD start is executed, a check is made to ensure the Broker ID and platform information found in the persistent store file is consistent with the Broker being started (provided the persistent store file is not empty). This is done to prevent accidental deletion of data in the persistent store by a different Broker ID. If you intend to COLD start Broker and to utilize a persistent store file which has been used previously by a different Broker ID, you must supply the additional `PSTORE-TYPE` parameter `FORCE-COLD=Y`.

Recommendations

- Perform regular backup operations on your Adabas database. The persistent store driver writes C1 checkpoint records at each start up and shut down of Broker.
- For performance reasons, execute Broker on the same machine as Adabas.

Broker Checkpoints in Adabas

During startup, Broker writes the following C1 checkpoint records to the Adabas database. The time, date and job name are recorded in the Adabas checkpoint log. This enables Adabas protection logs to be coordinated with Broker executions. This information can be read from Adabas, using the `ADAREP` utility with option `CPLIST`:

Broker Execution Name	Broker Execution Type	Adabas
ETBC	Broker Cold Start	Normal Cold Start
ETBH	Broker Hot Start	Normal Hot Start
ETBT	Broker Termination	Normal Termination

Adabas DBA Considerations

- [BLKSIZE : Adabas Persistent Store Parameter for Broker](#)
- [Table of Adabas Parameter Settings](#)
- [Estimating the Number of Records to be Stored](#)
- [Estimating the Number of Records to be Stored](#)
- [Tips on Transports, Platforms and Versions](#)
- [Copying the Persistent Store from/to another Adabas File or Database](#)

BLKSIZE : Adabas Persistent Store Parameter for Broker

Caution should be exercised when defining the block size (BLKSIZE) parameter for the Adabas persistent store. This determines how much UOW message data can be stored within a single Adabas record. Therefore, do not define a much larger block size than the size of the maximum unit of work being processed by Broker. (Remember to add 41 bytes for each message in the unit of work.) The advantage of having a good fit between the unit of work and the block size is that fewer records are required for each I/O operation.

It is necessary to consider the following Adabas parameters and settings when using Adabas for the persistent store file:

Table of Adabas Parameter Settings

Topic	Description
Allowing Sufficient Adabas UQ Elements	<p>Allow sufficient Adabas user queue (UQ) elements each time you start Broker. The Broker utilizes a number of user queue elements equal to the number of worker tasks (NUM-WORKER), plus two. Adabas timeout parameter (TNAE) determines how long the user queue elements will remain. This can be important if Broker is restarted after an abnormal termination, and provision must be made for sufficient user queue elements in the event of restarting Broker.</p> <p>Use either the Adabas utility ADAOPR or the Adabas DBA workbench to clean-up any user queue element belonging to the previous Broker job.</p>
Setting Size of Hold Queue Parameters	<p>Consideration must be given to the Adabas hold queue parameters NISNHQ and NH. These must be sufficiently large to allow Adabas to add/update/delete the actual number of records within a single unit of work.</p> <p>Example: where there are 100 message within a unit of work and the average message size is 10,000 bytes, the total unit of work size is 1 MB. If, for example, a 2 KB block size (default BLKSIZE=2000) is utilized by the Adabas persistent store driver, there will be 500 distinct records within a single Adabas commit (ET) operation, and provision must be made for this to occur successfully.</p>
Setting Adabas TT Parameter	<p>Consideration must be given to the Adabas transaction time (TT) parameter for cases where a large number of records is being updated within a single unit of work.</p>

Topic	Description
Defining LWP Size	Sufficient logical work pool (LWP) size must be defined so that the Adabas persistent store can update and commit the units of work. Adabas must be able to accommodate this in addition to any other processing for which it is used.
Executing Broker Kernel and Adabas Nucleus on Separate Machines	If Broker kernel is executed on a separate machine to the Adabas nucleus, with a different architecture and codepage, then we recommend running the Adabas nucleus with the UEC (universal conversion) option in order to ensure that Adabas C1 checkpoints are legible within the Adabas checkpoint log.
Setting INDEXCOMPRESSION=YES	This Adabas option can be applied to the Adabas file to reduce by approximately 50% the amount of space consumed in the indexes.
4-byte ISNs	If you anticipate having more than 16 million records within the persistent store file, you must use 4-byte ISNs when defining the Adabas file for EntireX.
Specification of Adabas LP Parameter	<p>Caution: This parameter must be specified large enough to allow the largest UOW to be stored in Adabas.</p> <p>If this is not large enough, Broker will detect an error (response 9; subresponse - 4 bytes - X'0003',C'LP') and Broker will not be able to write any further UOWs.</p> <p>See the description of the LP parameter under <i>ADARUN Parameters</i> in the <i>DBA Reference Summary</i> of the Adabas documentation.</p>

Estimating the Number of Records to be Stored

To calculate the Adabas file size it is necessary to estimate the number of records being stored. As an approximate guide, there will be one Adabas record (500 bytes) for each unprocessed unit of work, plus also n records containing the actual message data, which depends on the logical block size and the size of the unit of work. In addition, there will be one single record (500 bytes) for each unit of work having a persisted status.

Always allow ample space for the Adabas persistent store file since the continuous operation of Broker relies of the availability of this file to store and retrieve information.



Note: If the Adabas file space is exceeded, Broker will automatically terminate, and it will be necessary either to increase the space available to the file using Adabas utilities or to perform a Broker HOT start with `NEW-UOW-MESSAGES=NO` to allow units of work to be consumed before normal operation can continue.

Estimating the Number of Records to be Stored

In this example there are 100,000 Active UOW records at any one time. Each of these is associated with two message records containing the message data. UOW records are 500 bytes in length. Each message record contains 2,000 bytes. In addition, there are 500,000 UOW status records residing in the persistent store, for which the UOW has already been completely processed. These are 500 bytes long.



Note: The actual size of the data stored within the UOW message records is the sum of all the messages within the UOW, plus a 41-byte header for each message. Therefore, if the average message length is 59 bytes, the two 2,000 bytes, messages records, could contain $n = 4,000 / (59+41)$, or 40 messages. Adabas is assumed to compress the message data by 50% in the example (this can vary according to the nature of the message data).

3-byte ISNs and RABNs are assumed in this example. A device type of 8393 is used; therefore, the ASSO block size is 4,096, and DATA block size is 27,644. Padding factor of 10% is specified.

The following example calculates the space needed for Normal Index (NI), Upper Index (UI), Address Converter (AC) and Data Storage (DS).

Calculation Factors	Required Space
<ul style="list-style-type: none"> ■ Number entries for descriptor WK (21-byte unique key) 	<ul style="list-style-type: none"> ■ = number UOW records: 0.1 + 0.5 million + number message records: 0.2 million
<ul style="list-style-type: none"> ■ NI Space for descriptor WK ■ (3-byte ISN) ■ (4,092 ASSO block 10% padding) 	<ul style="list-style-type: none"> ■ = $800,000 * (3 + 21 + 2)$ ■ = 20,800,000 bytes ■ = 5,648 blocks
<ul style="list-style-type: none"> ■ UI Space for descriptor WK ■ (3-byte ISN + 3-byte RABN) ■ (4,092 ASSO block 10% padding) 	<ul style="list-style-type: none"> ■ = $5,648 * (21 + 3 + 3 + 1)$ ■ = 158,140 bytes ■ = 43 blocks
<ul style="list-style-type: none"> ■ Number entries for descriptor WI (8-byte unique key) 	<ul style="list-style-type: none"> ■ = number processed UOW records: 0.5 million
<ul style="list-style-type: none"> ■ NI Space for descriptor WI ■ (3-byte ISN) ■ (4,092 ASSO block 10% padding) 	<ul style="list-style-type: none"> ■ = $500,000 * (3 + 8 + 2)$ ■ = 6,500,000 bytes ■ = 1,765 blocks
<ul style="list-style-type: none"> ■ UI Space for descriptor WI ■ (3-byte ISN and 3 byte RABN) ■ (4,092 ASSO block 10% padding) 	<ul style="list-style-type: none"> ■ = $17,649 * (8 + 3 + 3 + 1)$ ■ = 26,475 bytes ■ = 8 blocks

Calculation Factors	Required Space
<ul style="list-style-type: none"> ■ Number entries for descriptor WL (96 byte key) 	<ul style="list-style-type: none"> ■ = number UOW records 0.1 + 0.5 million
<ul style="list-style-type: none"> ■ NI Space for descriptor WL ■ (3-byte ISN) ■ (4,092 ASSO block 10% padding) 	<ul style="list-style-type: none"> ■ = $600,000 * (3 + 96 + 2)$ ■ = 60,600,000 bytes ■ = 16,455 blocks
<ul style="list-style-type: none"> ■ UI Space for descriptor WL ■ (3-byte ISN and 3 byte RABN) ■ (4,092 ASSO block 10% padding) 	<ul style="list-style-type: none"> ■ = $164,548 * (96 + 3 + 3 + 1)$ ■ = 16,948,517 bytes ■ = 461 blocks
<ul style="list-style-type: none"> ■ Address Converter space ■ (4,092 ASSO block) 	<ul style="list-style-type: none"> ■ = $(800,000 + 1) * 3 / 4092$ ■ = 587 blocks
<ul style="list-style-type: none"> ■ Data storage for message data (2,000-byte records compressed by 50%) 	<ul style="list-style-type: none"> ■ = $0.2 \text{ million} * 2000 * 0.5 = 200,000,000 \text{ bytes}$
<ul style="list-style-type: none"> ■ Data storage for UOW data (2,000-byte records compressed by 50%) 	<ul style="list-style-type: none"> ■ = $0.6 \text{ million} * 500 * 0.5 = 150,000,000 \text{ byte}$
<ul style="list-style-type: none"> ■ Combined space required for data (27,644 DATA block 10% padding) 	<ul style="list-style-type: none"> ■ = 14,068 blocks
Entity Requiring Space	Total Required Space
Normal Index (NI)	= 23,868 blocks
Upper Index (UI)	= 512 blocks
Data Storage (DS)	= 14,068 blocks
Address Converter (AC)	= 587 blocks

Tips on Transports, Platforms and Versions

■ **Entire Net-Work**

If you intend to use Adabas persistent store through Entire Net-Work, see the Entire Net-Work documentation for installation and configuration details.

■ **Adabas Versions**

Adabas persistent store can be used on all Adabas versions currently released and supported by Software AG.

■ **Prerequisite Versions of Entire Net-Work with Adabas**

See the Adabas and Entire Net-Work documentation to determine prerequisite versions of Entire Net-Work to use with Adabas at your site.

Copying the Persistent Store from/to another Adabas File or Database

The DBA can perform an UNLOAD of the Adabas file in which the persistent store is located (this must be done when Broker is not running). This allows the persistent store to be LOADED into another Adabas file, in the same or in another Adabas database. Broker can then be restarted (PSTORE=HOT) with the attributes specifying the new location of the persistent store file. See [Table of Adabas Parameter Settings](#) above. See separate Adabas documentation for details of Adabas utilities for UNLOAD and LOAD operations.

The persistent store file can only be reloaded into another Adabas database running on the same platform type as the Adabas database from which it was unloaded.

c-tree Database as Persistent Store

EntireX provides a c-tree © persistent driver based on the c-tree© User API of the FairCom Corporation ®. This driver manages a fast and reliable embedded local database.

In order to operate EntireX using the c-tree persistent store option, you must assign Broker attribute PSTORE-TYPE=CTREE. No other attributes are required. However, several attributes are supported to set additional optional attributes for the c-tree store. See *c-tree-specific Attributes* (DEFAULTS=CTREE) under *Broker Attributes* in the platform-independent administration documentation for details.

Migrating the Persistent Store

The contents of EntireX Broker's persistent store can be migrated to a new persistent store in order to change the PSTORE type or to use the same type of PSTORE with increased capacity.

The migration procedure outlined here requires two Broker instances started with a special `RUN-MODE` parameter. One Broker unloads the contents of the persistent store and transmits the data to the other Broker, which loads data into the new PSTORE. Therefore, for the purposes of this discussion, we will refer to an *unload* Broker and a *load* Broker.

This procedure is based on Broker-to-Broker communication to establish a communication link between two Broker instances. It does not use any conversion facilities, since the migration procedure is supported for homogeneous platforms only.

- [Configuration](#)
- [Migration Procedure](#)

Configuration

The migration procedure requires two Broker instances started with the `RUN-MODE` parameter. The unload Broker should be started with the following attribute:

```
RUN-MODE=PSTORE-UNLOAD
```

The load Broker should be started with the following attribute:

```
RUN-MODE=PSTORE-LOAD
```

These commands instruct the Broker instances to perform the PSTORE migration.



Note: The attribute `PARTNER-CLUSTER-ADDRESS` must be defined in both Broker instances to specify the transport address of the load Broker. The unload Broker must know the address of the load broker, and the load Broker must in turn know the address of the unload Broker.

Example:

Broker ETB001 performs the unload on host HOST1, and Broker ETB002 performs the load on host HOST2. The transmission is based on TCP/IP. Therefore, Broker ETB001 starts the TCP/IP communicator to establish port 1971, and Broker ETB002 starts the TCP/IP communicator to establish port 1972.

For ETB001, attribute `PARTNER-CLUSTER-ADDRESS=HOST2:1972:TCP` is set, and for ETB002, attribute `PARTNER-CLUSTER-ADDRESS=HOST1:1971:TCP` is set to establish the Broker-to-Broker communication between the two Broker instances.

In addition to attributes `RUN-MODE` and `PARTNER-CLUSTER-ADDRESS`, a fully functioning Broker configuration is required when starting the two Broker instances. To access an existing PSTORE on the unloader side, you must set the attribute `PSTORE=HOT`. To load the data into the new PSTORE on the loader side, you must set the attribute `PSTORE=COLD`. The load process requires an empty PSTORE at the beginning of the load process.



Note: Use caution not to assign `PSTORE=COLD` to your unload Broker instance, as this startup process will erase all data currently in the PSTORE.

For the migration process, the unload Broker and the load Broker must be assigned different persistent stores.

A report can be generated to detail all of the contents of the existing persistent store. At the end of the migration process, a second report can be run on the resulting new persistent store. These two reports can be compared to ensure that all contents were migrated properly. To run these reports, set the attribute `PSTORE-REPORT=YES`. See `PSTORE` for detailed description, especially for the file assignment.

Migration Procedure

The migration procedure is made up of three steps.

Step 1

The unload Broker and the load Broker instances can be started independently of each other. Each instance will wait for the other to become available before starting the unload/load procedure.

The unload Broker instance sends a handshake request to the load Broker instance in order to perform an initial compatibility check. This validation is performed by Broker according to platform architecture type and Broker version number. The handshake ensures a correctly configured partner cluster address and ensures that the user did not assign the same PSTORE to both Broker instances. If a problem is detected, an error message will be issued and both Broker instances will stop.

Step 2

The unload Broker instance reads all PSTORE data in a special non-destructive raw mode and transmits the data to the load Broker instance. The load Broker instance writes the unchanged raw data to the new PSTORE. A report is created if `PSTORE-REPORT=YES` is specified, and a valid output file for the report is specified.

Step 3

The unload Broker instance requests a summary report from the load Broker instance to compare the amount of migrated data. The result of this check is reported by the unload Broker instance and the load Broker instance before they shut down.

When a Broker instances is started in `RUN-MODE=PSTORE-LOAD` or `RUN-MODE=PSTORE-UNLOAD`, the Broker instances only allow Administration requests. All other user requests are prohibited.

**Notes:**

1. The contents of the persistent store are copied to the new persistent store as an exact replica. No filtering of unnecessary information will be performed, for example, UOWs in received state. The master records will not be updated.
2. Before restarting your Broker with the new persistent store, be sure to change your PSTORE attribute to `PSTORE=HOT`. *Do not* start your broker with the new persistence store using `PSTORE=COLD`; this startup process will erase all of the data in your persistent store.
3. After completing the migration process and restarting your broker in a normal run-mode, it is important not to bring both the new PSTORE and the old PSTORE back online using separate Broker instances; otherwise, applications would receive the same data twice. Once the migration process is completed satisfactorily, and is validated, the old PSTORE contents should be discarded.

12 Broker Resource Allocation

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The EntireX Broker is a multithreaded application and communicates among multiple tasks in memory pools. If you do not need to restrict the memory expansion of EntireX Broker, we strongly recommend you enable the dynamic memory management in order to handle changing workload appropriately. See *Dynamic Memory Management* under *Broker Resource Allocation* in the general administration documentation below. If dynamic memory management is disabled, non-expandable memory is allocated during startup to store all internal control blocks and the contents of messages.

General Considerations

Resource considerations apply to both the global and service-specific levels:

- Dynamic assignment of global resources to services that need them prevents the return of a “Resource Shortage” code to an application when resources are available globally. It also enables the EntireX Broker to run with fewer total resources, although it does not guarantee the availability of a specific set of resources for a particular service.
- Flow control ensures that individual services do not influence the behavior of other services by accident, error, or simply overload. This means that you can restrict the resource consumption of particular services in order to shield the other services.

In order to satisfy both global and service-specific requirements, the EntireX Broker allows you to allocate resources for each individual service or define global resources which are then allocated dynamically to any service that needs them.

The resources in question are the number of conversations, number of servers, plus units of work and the message storage, separated in a long buffer of 4096 bytes and short buffer of 256 bytes. These resources are typically the bottleneck in a system, especially when you consider that non-conversational communication is treated as the special case of “conversations with a single message only” within the EntireX Broker.

Global resources are defined by the parameters in the Broker section of the attribute file. The number of conversations allocated to each service is defined in the service-specific section of the attribute file. Because the conversations are shared by all servers that provide the service, a larger number of conversations should be allocated to services that are provided by more than one server. The number of conversations required is also affected by the number of clients accessing the service in parallel.

Specifying Global Resources

You can specify a set of global resources with no restrictions on which service allocates the resources:

- Specify the global attributes with the desired values.
- Do not specify any additional restrictions. That is, do not provide values for the following Broker-specific attributes:

```
LONG-BUFFER-DEFAULT  
SHORT-BUFFER-DEFAULT  
CONV-DEFAULT  
SERVER-DEFAULT
```

- Also, do not provide values for the following server-specific attributes:

```
LONG-BUFFER-LIMIT  
SERVER-LIMIT  
SHORT-BUFFER-LIMIT  
CONV-LIMIT
```

Example

The following example defines global resources. If no additional definitions are specified, resources are allocated and assigned to any server that needs them.

```
NUM-CONVERSATION=1000  
NUM-LONG-BUFFER=200  
NUM-SHORT-BUFFER=2000  
NUM-SERVER=100
```

Restricting the Resources of Particular Services

You can restrict resource allocation for particular services in advance:

- Use `CONV-LIMIT` to limit the resource consumption for a specific service.
- Use `CONV-DEFAULT` to provide a default limit for services for which `CONV-LIMIT` is not defined.

Example

In the following example, attributes are used to restrict resource allocation:

```
DEFAULTS=BROKER
NUM-CONVERSATION=1000
CONV-DEFAULT=200

DEFAULTS=SERVICE
CLASS=A, SERVER=A, SERVICE=A, CONV-LIMIT=100
CLASS=B, SERVER=B, SERVICE=B, CONV-LIMIT=UNLIM
CLASS=C, SERVER=C, SERVICE=C
```

- Memory for a total of 1000 conversions is allocated (NUM-CONVERSATION=1000).
- Service A (CLASS A, SERVER A, SERVICE A) is limited to 100 conversation control blocks used simultaneously (CONV-LIMIT=100). The application that wants to start more conversations than specified by the limit policy will receive a “Resource shortage” return code. This return code should result in a retry of the desired operation a little later, when the resource situation may have changed.
- Service B (CLASS B, SERVER B, SERVICE B) is allowed to try to allocate as many resources as necessary, provided the resources are available and not occupied by other services. The number of conversations that may be used by this service is unlimited (CONV-LIMIT=UNLIM).
- Service C (CLASS C, SERVER C, SERVICE C) has no explicit value for the CONV-LIMIT attribute. The number of conversation control blocks that it is allowed to use is therefore limited to the default value which is defined by the CONV-DEFAULT Broker attribute.

The same scheme applies to the allocation of message buffers and servers:

- In the following example, long message buffers are allocated using the keywords NUM-LONG-BUFFER, LONG-BUFFER-DEFAULT and LONG-BUFFER-LIMIT:

```
DEFAULTS=BROKER
NUM-LONG-BUFFER=2000
LONG-BUFFER-DEFAULT=250

DEFAULTS=SERVICE
CLASS=A, SERVER=A, SERVICE=A, LONG-BUFFER-LIMIT=100
CLASS=B, SERVER=B, SERVICE=B, LONG-BUFFER-LIMIT=UNLIM
CLASS=C, SERVER=C, SERVICE=C
```

- In the following example, short message buffers are allocated using the keywords NUM-SHORT-BUFFER, SHORT-BUFFER-DEFAULT and SHORT-BUFFER-LIMIT:

```
DEFAULTS=BROKER
NUM-SHORT-BUFFER=2000
SHORT-BUFFER-DEFAULT=250

DEFAULTS=SERVICE
CLASS=A, SERVER=A, SERVICE=A, SHORT-BUFFER-LIMIT=100
CLASS=B, SERVER=B, SERVICE=B, SHORT-BUFFER-LIMIT=UNLIM
CLASS=C, SERVER=C, SERVICE=C
```

- In the following example, servers are allocated using the keywords NUM-SERVER, SERVER-DEFAULT and SERVER-LIMIT:

```

DEFAULTS=BROKER
NUM-SERVER=2000
SERVER-DEFAULT=250

DEFAULTS=SERVICE
CLASS=A, SERVER=A, SERVICE=A, SERVER-LIMIT=100
CLASS=B, SERVER=B, SERVICE=B, SERVER-LIMIT=UNLIM
CLASS=C, SERVER=C, SERVICE=C

```

Specifying Attributes for Privileged Services

If privileged services (services with access to unlimited resources) exist, specify UNLIMITED for the attributes CONV-LIMIT, SERVER-LIMIT, LONG-BUFFER-LIMIT and SHORT-BUFFER-LIMIT in the service-specific section of the attribute file.

For example:

```

DEFAULTS=SERVICE
CONV-LIMIT=UNLIM
LONG-BUFFER-LIMIT=UNLIM
SHORT-BUFFER-LIMIT=UNLIM
SERVER-LIMIT=UNLIM

```

To ensure a resource reservoir for peak load of privileged services, define more resources than would normally be expected by specifying larger numbers for the Broker attributes that control global resources:

```

NUM-SERVER
NUM-CONVERSATION
CONV-DEFAULT
LONG-BUFFER-DEFAULT
SHORT-BUFFER-DEFAULT
SERVER-DEFAULT

```

Maximum Units of Work

The maximum number of units of work (UOWs) that can be active concurrently is specified in the Broker attribute file. The `MAX-UOWS` attribute can be specified for the Broker globally as well as for individual services. It cannot be calculated automatically. If a service is intended to process UOWs, a `MAX-UOWS` value must be specified.

If message processing only is to be done, specify `MAX-UOWS=0` (zero). The Broker (or the service) will not accept units of work, i.e., it will process only messages that are not part of a UOW. Zero is used as the default value for `MAX-UOWS` in order to prevent the sending of UOWs to services that are not intended to process them.

Calculating Resources Automatically

To ensure that each service runs without impacting other services, allow the EntireX Broker to calculate resource requirements automatically:

- Ensure that the attributes that define the default total for the Broker and the limit for each service are not set to `UNLIM`.
- Specify `AUTO` for the Broker attribute that defines the total number of the resource.
- Specify a suitable value for the Broker attribute that defines the default number of the resource.

The total number required will be calculated from the number defined for each service. The resources that can be calculated this way are Number of Conversations, Number of Servers, Long Message Buffers and Short Message Buffers.

Avoid altering the service-specific definitions at runtime. Doing so could corrupt the conversation consistency. Applications might receive a message such as “`NUM-CONVERSATIONS` reached” although the addressed service does not serve as many conversations as defined. The same applies to the attributes that define the long and short buffer resources.

Automatic resource calculation has the additional advantage of limiting the amount of memory used to run the EntireX Broker. Over time, you should be able to determine which services need more resources by noting the occurrence of the return code “resource shortage, please retry”. You can then increase the resources for these services. To avoid disruption to the user, you could instead allocate a relatively large set of resources initially and then decrease the values using information gained from the Administration Monitor application.

Number of Conversations

To calculate the total number of conversations automatically, ensure that the `CONV-DEFAULT` Broker attribute and the `CONV-LIMIT` service-specific attribute are not set to `UNLIM` anywhere in the attribute

file. Specify `NUM-CONVERSATION=AUTO` and an appropriate value for the `CONV-DEFAULT` Broker attribute. The total number of conversations will be calculated using the value specified for each service.

For example:

```
DEFAULTS=BROKER
NUM-CONVERSATION=AUTO
CONV-DEFAULT=200

DEFAULTS=SERVICE
CLASS=A, SERVER=A, SERVICE=A
CLASS=B, SERVER=B, SERVICE=B, CONV-LIMIT=100
CLASS=C, SERVER=C, SERVICE=C
```

- Service A and Service C both need 200 conversations (the default value). Service B needs 100 conversations (`CONV-LIMIT=100`).
- Because `NUM-CONVERSATIONS` is defined as `AUTO`, the broker calculates a total of 500 conversations ($200 + 200 + 100$).
- `NUM-CONVERSATIONS=AUTO` allows the number of conversations to be flexible without requiring additional specifications. It also ensures that the broker is started with enough resources to meet all the demands of the individual services.
- `AUTO` and `UNLIM` are mutually exclusive. If `CONV-DEFAULT` or a single `CONV-LIMIT` is defined as `UNLIM`, the EntireX Broker cannot determine the number of conversations to use in the calculation, and the EntireX Broker cannot be started.

Number of Servers

To calculate the number of servers automatically, ensure that the `SERVER-DEFAULT` Broker attribute and the `SERVER-LIMIT` service-specific attribute are not set to `UNLIM` anywhere in the attribute file. Specify `NUM-SERVER=AUTO` and an appropriate value for the `SERVER-DEFAULT` Broker attribute. The total number of server buffers will be calculated using the value specified for each service.

For example:

```
DEFAULTS=BROKER
NUM-SERVER=AUTO
SERVER-DEFAULT=250

DEFAULTS=SERVICE
CLASS=A, SERVER=A, SERVICE=A, SERVER-LIMIT=100
CLASS=B, SERVER=B, SERVICE=B
CLASS=C, SERVER=C, SERVICE=C
```

Long Message Buffers

To calculate the number of long message buffers automatically, ensure that the `LONG-BUFFER-DEFAULT` Broker attribute and the `LONG-BUFFER-LIMIT` service-specific attribute are not set to `UNLIM`

anywhere in the attribute file. Specify `NUM-LONG-BUFFER=AUTO` and an appropriate value for the `LONG-BUFFER-DEFAULT` Broker attribute. The total number of long message buffers will be calculated using the value specified for each service.

For example:

```
DEFAULTS=BROKER
NUM-LONG-BUFFER=AUTO
LONG-BUFFER-DEFAULT=250

DEFAULTS=SERVICE
CLASS=A, SERVER=A, SERVICE=A, LONG-BUFFER-LIMIT=100
CLASS=B, SERVER=B, SERVICE=B
CLASS=C, SERVER=C, SERVICE=C
```

Short Message Buffers

To calculate the number of short message buffers automatically, ensure that the `SHORT-BUFFER-DEFAULT` Broker attribute and the `SHORT-BUFFER-LIMIT` service-specific attribute are not set to `UNLIM` anywhere in the attribute file. Specify `NUM-SHORT-BUFFER=AUTO` and an appropriate value for the `SHORT-BUFFER-DEFAULT` Broker attribute. The total number of short message buffers will be calculated using the value specified for each service.

For example:

```
DEFAULTS=BROKER
NUM-SHORT-BUFFER=AUTO
SHORT-BUFFER-DEFAULT=250

DEFAULTS=SERVICE
CLASS=A, SERVER=A, SERVICE=A
CLASS=B, SERVER=B, SERVICE=B, SHORT-BUFFER-LIMIT=100
CLASS=C, SERVER=C, SERVICE=C
```

Dynamic Memory Management

Dynamic memory management is a feature to handle changing Broker workload without any restart of the Broker task. It increases the availability of the Broker by using various memory pools for various Broker resources and by being able to use a variable number of pools for the resources.

If more memory is needed than currently available, another memory pool is allocated for the specific type of resource. If a particular memory pool is no longer used, it will be deallocated.

The following Broker attributes can be omitted if `DYNAMIC-MEMORY-MANAGEMENT=YES` has been defined:

- NUM-CLIENT ■ NUM-PUBLISHER ■ NUM-SUBSCRIBER-TOTAL
- NUM-CMDLOG-FILTER ■ NUM-SERVER ■ NUM-TOPIC
- NUM-COMBUF ■ NUM-SERVICE ■ NUM-TOPIC-EXTENSION
- NUM-CONV[ERSATION] ■ NUM-SERVICE-EXTENSION ■ NUM-TOPIC-TOTAL
- NUM-LONG[-BUFFER] ■ NUM-SHORT[-BUFFER] ■ NUM-UOW|MAX-UOW|MUOW
- NUM-PUBLICATION ■ NUM-SUBSCRIBER ■ NUM-WQE

If you want statistics on allocation and deallocation operations in Broker, you can configure Broker to create a storage report with the attribute `STORAGE-REPORT`. See [Storage Report](#) below.



Note: To ensure a stable environment, some pools of Broker are not deallocated automatically. The first pools of type `COMMUNICATION`, `CONVERSATION`, `CONNECTION`, `HEAP`, `PARTICIPANT`, `PARTICIPANT EXTENSION`, `SERVICE ATTRIBUTES`, `SERVICE`, `SERVICE EXTENSION`, `TIMEOUT QUEUE`, `TRANSLATION`, `WORK QUEUE` are excluded from the automatic deallocation even when they have not been used for quite some time. Large pools cannot be reallocated under some circumstances if the level of fragmentation in the address space has been increased in the meantime.

Dynamic Worker Management

Dynamic worker management is a feature to handle the fluctuating broker workload without re-starting the Broker task. It adjusts the number of running worker tasks according to current workload. The initial portion of worker tasks started at Broker startup is still determined by `NUM-WORKER`.

If more workers are needed than currently available, another worker task is started. If a worker task is no longer needed, it will be stopped.

The following Broker attributes are used for the configuration if `DYNAMIC-WORKER-MANAGEMENT=YES` has been defined:

- `WORKER-MAX`
- `WORKER-MIN`
- `WORKER-NONACT`
- `WORKER-QUEUE-DEPTH`
- `WORKER-START-DELAY`

The following two attributes are very performance-sensitive:

- Attribute `WORKER-QUEUE-DEPTH` defines the number of unassigned user requests in the input queue before a new worker task is started.

- Attribute `WORKER-START-DELAY` defines the time between the last worker task startup and the next check for another possible worker task startup. It is needed to consider the time for activating a worker task.

Both attributes depend on the environment, in particular the underlying operating system and the hardware. The goal is to achieve high-performance user request processing without starting too many worker tasks.

A good starting point to achieve high performance is not to change the attributes and to observe the performance of the application programs after activating the dynamic worker management.

If broker attribute `DYNAMIC-WORKER-MANAGEMENT=YES` is set, operator commands are available under `z/OS` to deactivate and subsequently reactivate dynamic worker management.

The following section illustrates the two different modes of dynamic worker management:

■ Scenario 1

```
DYNAMIC-WORKER-MANAGEMENT=YES
NUM-WORKER = 5
WORKER-MIN = 1
WORKER-MAX = 32
```

Broker is started with 5 worker tasks and then dynamically varies the number of worker tasks within the range from `WORKER-MIN=1` to `WORKER-MAX=32` due to `DYNAMIC-WORKER-MANAGEMENT=YES`.

■ Scenario 2

```
DYNAMIC-WORKER-MANAGEMENT=NO
NUM-WORKER = 5
WORKER-MIN = 1
WORKER-MAX = 32
```

Broker is started with 5 worker tasks. The `WORKER-MIN/MAX` attributes are ignored due to `DYNAMIC-WORKER-MANAGEMENT=NO`.

Storage Report

You can create an optional report file that provides details about all activities to allocate or to deallocate memory pools. This section details how to create the report and provides a sample report.

- [Creating a Storage Report](#)
- [Platform-specific Rules](#)
- [Sample Storage Report](#)

See also Broker-specific attribute `STORAGE-REPORT`.

Creating a Storage Report

Use Broker's global attribute `STORAGE-REPORT` with the value `YES`. If attribute value `YES` is supplied, all memory pool operations will be reported if the output mechanism is available. If the value `NO` is specified, no report will be created.

Platform-specific Rules

Broker creates a file with the name `STORAGE.REPORT` in the current working directory. If the environment variable `ETB_STORAGE_REPORT` is supplied, the file name specified in the environment variable will be used. If Broker receives the command-line argument `-r`, the token following argument `-r` will be used as the file name.

Sample Storage Report

The following is an excerpt from a sample `STORAGE` report.

EntireX 8.1.0.00 STORAGE Report 2009-06-26 12:28:58 Page 1					
Identifier		Address	Size	Total	Date
Time	Action				
12:28:58.768	Allocated	0x25E48010	407184 bytes	407184 bytes	2009-06-26
12:28:58.769	Allocated	0x25EB4010	1050692 bytes	1457876 bytes	2009-06-26
12:28:58.769	Allocated	0x25FB5010	16781380 bytes	18239256 bytes	2009-06-26
12:28:58.769	Allocated	0x26FB7010	762052 bytes	19001308 bytes	2009-06-26
12:28:58.775	Allocated	0x27072010	61540 bytes	19062848 bytes	2009-06-26
12:28:58.775	Allocated	0x27082010	368964 bytes	19431812 bytes	2009-06-26
12:28:58.779	Allocated	0x270DD010	233668 bytes	19665480 bytes	2009-06-26
12:28:58.782	Allocated	0x27117010	4395204 bytes	24060684 bytes	2009-06-26
12:28:58.806	Allocated	0x27549010	3703876 bytes	27764560 bytes	2009-06-26
12:28:58.827	Allocated	0x278D2010	134244 bytes	27898804 bytes	2009-06-26
12:28:58.829	Allocated	0x278F3010	36996 bytes	27935800 bytes	2009-06-26
12:28:58.829	Allocated	0x278FD010	26724 bytes	27962524 bytes	2009-06-26
12:28:58.829	Allocated	0x27904010	131668 bytes	28094192 bytes	2009-06-26

Broker Resource Allocation

SERVICE POOL	0x27925010	54372 bytes	28148564 bytes	2009-06-26	↔
12:28:58.830 Allocated					
SERVICE EXTENSION POOL	0x27933010	32900 bytes	28181464 bytes	2009-06-26	↔
12:28:58.831 Allocated					
TIMEOUT QUEUE POOL	0x2793C010	87268 bytes	28268732 bytes	2009-06-26	↔
12:28:58.831 Allocated					
TRANSLATION POOL	0x27952010	179300 bytes	28448032 bytes	2009-06-26	↔
12:28:58.832 Allocated					
UNIT OF WORK POOL	0x2797E010	176324 bytes	28624356 bytes	2009-06-26	↔
12:28:58.834 Allocated					
WORK QUEUE POOL	0x279AA010	391268 bytes	29015624 bytes	2009-06-26	↔
12:28:58.835 Allocated					
BLACKLIST POOL	0x27A0A010	42084 bytes	29057708 bytes	2009-06-26	↔
12:28:58.838 Allocated					
SUBSCRIPTION POOL	0x27A15010	344148 bytes	29401856 bytes	2009-06-26	↔
12:28:58.839 Allocated					
TOPIC ATTRIBUTES POOL	0x27A6A010	129620 bytes	29531476 bytes	2009-06-26	↔
12:28:58.841 Allocated					
TOPIC POOL	0x26FB6068	2952 bytes	29534428 bytes	2009-06-26	↔
12:28:58.842 Allocated					
TOPIC EXTENSION POOL	0x27A8A010	30852 bytes	29565280 bytes	2009-06-26	↔
12:28:58.842 Allocated					
PSTORE SUBSCRIBER POOL	0x27A92010	33892 bytes	29599172 bytes	2009-06-26	↔
12:28:58.843 Allocated					
PSTORE TOPIC POOL	0x27A9B010	19540 bytes	29618712 bytes	2009-06-26	↔
12:28:58.843 Allocated					
COMMUNICATION POOL	0x25FB5010	16781380 bytes	12837332 bytes	2009-06-26	↔
12:30:58.514 Deallocated					
ACCOUNTING POOL	0x26FB7010	762052 bytes	12075280 bytes	2009-06-26	↔
12:30:58.515 Deallocated					
BROKER POOL	0x27072010	61540 bytes	12013740 bytes	2009-06-26	↔
12:30:58.516 Deallocated					
CONVERSATION POOL	0x27082010	368964 bytes	11644776 bytes	2009-06-26	↔
12:30:58.518 Deallocated					
CONNECTION POOL	0x270DD010	233668 bytes	11411108 bytes	2009-06-26	↔
12:30:58.519 Deallocated					
LONG MESSAGES POOL	0x27117010	4395204 bytes	7015904 bytes	2009-06-26	↔
12:30:58.520 Deallocated					
SHORT MESSAGES POOL	0x27549010	3703876 bytes	3312028 bytes	2009-06-26	↔
12:30:58.526 Deallocated					
PROXY QUEUE POOL	0x278FD010	26724 bytes	3285304 bytes	2009-06-26	↔
12:30:58.530 Deallocated					
SUBSCRIPTION POOL	0x27A15010	344148 bytes	2941156 bytes	2009-06-26	↔
12:30:58.530 Deallocated					
TOPIC ATTRIBUTES POOL	0x27A6A010	129620 bytes	2811536 bytes	2009-06-26	↔
12:30:58.531 Deallocated					
TOPIC POOL	0x26FB6068	2952 bytes	2808584 bytes	2009-06-26	↔
12:30:58.531 Deallocated					
TOPIC EXTENSION POOL	0x27A8A010	30852 bytes	2777732 bytes	2009-06-26	↔
12:30:58.531 Deallocated					
TIMEOUT QUEUE POOL	0x2793C010	87268 bytes	2690464 bytes	2009-06-26	↔
12:30:58.532 Deallocated					

UNIT OF WORK POOL	0x2797E010	176324 bytes	2514140 bytes	2009-06-26	↔
12:30:58.533 Deallocated					
WORK QUEUE POOL	0x279AA010	391268 bytes	2122872 bytes	2009-06-26	↔
12:30:58.533 Deallocated					
BLACKLIST POOL	0x27A0A010	42084 bytes	2080788 bytes	2009-06-26	↔
12:30:58.534 Deallocated					
PSTORE SUBSCRIBER POOL	0x27A92010	33892 bytes	2046896 bytes	2009-06-26	↔
12:30:58.534 Deallocated					
PSTORE TOPIC POOL	0x27A9B010	19540 bytes	2027356 bytes	2009-06-26	↔
12:30:58.534 Deallocated					
PARTICIPANT POOL	0x278D2010	134244 bytes	1893112 bytes	2009-06-26	↔
12:49:25.817 Deallocated					
PARTICIPANT EXTENSION POOL	0x278F3010	36996 bytes	1856116 bytes	2009-06-26	↔
12:49:25.818 Deallocated					
SERVICE ATTRIBUTES POOL	0x27904010	131668 bytes	1724448 bytes	2009-06-26	↔
12:49:25.818 Deallocated					
SERVICE POOL	0x27925010	54372 bytes	1670076 bytes	2009-06-26	↔
12:49:25.818 Deallocated					
SERVICE EXTENSION POOL	0x27933010	32900 bytes	1637176 bytes	2009-06-26	↔
12:49:25.819 Deallocated					
TRANSLATION POOL	0x27952010	179300 bytes	1457876 bytes	2009-06-26	↔
12:49:25.819 Deallocated					
HEAP POOL	0x25EB4010	1050692 bytes	407184 bytes	2009-06-26	↔
12:49:25.820 Deallocated					
KERNEL POOL	0x25E48010	407184 bytes	0 bytes	2009-06-26	↔
12:49:25.820 Deallocated					

Header	Description
Identifier	Name of the memory pool.
Address	Start address of the memory pool.
Size	Size of the memory pool.
Total	Total size of all obtained memory pools.
Date, Time	Date and time of the action.
Action	The action of Broker. The following actions are currently supported: Allocated: memory pool is allocated . Deallocated: memory pool is deallocated.

Maximum TCP/IP Connections per Communicator

This table shows the maximum number of TCP/IP connections per communicator:

Platform	Maximum Number of TCP/IP Connections per Communicator
AIX	2,048
BS2000/OSD	2,048
HP-UX	2,048
Linux	4,096
Solaris	65,356
Windows	4,096
z/OS	16,384
z/VSE	2,048

With the Broker-specific attribute `POLL`, these restrictions can be lifted under z/OS, UNIX and z/VSE. See `POLL`.

See also `MAX-CONNECTIONS` under `TCP-OBJECT (Struct INFO_TCP)` under *Information Reply Structures* in the Broker CIS documentation.

13 Administration of Broker Stubs

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- Transport Methods for Broker Stubs 196
- Tracing for Broker Stubs 199
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Available Stubs

The following table lists available stubs and gives an overview of available features and supported transport methods.

Stub	Language	Transport Methods	Compression	More Information
broker.dll *	C	TCP / SSL	Yes	See below.
Jaci	Java	TCP /SSL	Yes	See <i>Java ACI</i> in the Developer's Kit documentation.

(*) Stub broker32.dll is still supported for reasons of backward compatibility. The functionality is identical to broker.dll.

Transport Methods for Broker Stubs

The Broker stub can use TCP/IP and Secure Sockets Layer.

- [Using TCP/IP as Transport Method for the Broker Stub](#)
- [Using SSL or TLS as Transport Method for the Broker Stub](#)
- [Setting the Timeout for the Transport Method](#)
- [Limiting the TCP/IP Connection Lifetime](#)
- [Modifying the Hosts and Services Tables](#)

Using TCP/IP as Transport Method for the Broker Stub

▶ To use TCP/IP

- 1 Optional: set the timeout, see [Setting the Timeout for the Transport Method](#).
- 2 The Broker stub requires the IP address and the TCP port number (if the Broker's default TCP port number 1971 cannot be used) for each BROKER-ID. Either add an entry in the Domain Name System (DNS) or modify your local hosts and services tables. See [Modifying the Hosts and Services Tables](#).

You can check whether the Broker has already been added to your DNS with the command:

```
ping <broker-id>
```

for example: ping ETB001. If a message such as “...is alive” or “Reply from ...” is displayed (the text displayed varies depending on your ping implementation), the name is known to your DNS and the host where the Broker is running is reachable. However, this does not necessarily mean that the Broker is active.

Using SSL or TLS as Transport Method for the Broker Stub



Note: The SETSSLPARMS function must contain the subparameter VERIFY_SERVER=N, unless the common name of the server certificate matches the Broker name. Otherwise, the connection will be refused.

Example:

```
TRUST_STORE=C:\SoftwareAG\EntireX\ExxCACert.pem&VERIFY_SERVER=N
```

▶ To use Secure Sockets Layer

- 1 To operate with Secure Sockets Layer, certificates need to be provided and maintained. Software AG provides default certificates, but we strongly recommend that you create your own, for example, with the OpenSSL toolkit. The certificates must be installed locally with the EntireX Broker Stub.
- 2 Set the value SSL as part of the Broker ID (see the field BROKER-ID in the ACI control block, see also *Using the Broker ID in Applications* in the ACI Programming documentation) and set the SSL parameters (see [Setting SSL or TLS Parameters](#)). Example: localhost:1958:SSL.

The SSL parameters can be specified with the FCT_SETSSLPARMS call type for ACI programs, or they can be appended with a “?” to the broker ID (Java stub).

- 3 The Broker stub requires the IP address and the SSL port number for each BROKER-ID. Either add an entry to the Domain Name System (DNS) or modify your local hosts and services tables. See [Modifying the Hosts and Services Tables](#).

The default port number is 1958.

You can check whether the Broker has already been added to your DNS with the following command:

```
ping <broker-id>
```

for example: ping ETB001. If a message such as "...is alive" or "Reply from ..." is displayed (the text displayed varies depending on your ping implementation), the name is known to your DNS and the host where the Broker is running is reachable. However, this does not necessarily mean that the Broker is active.

Setting SSL or TLS Parameters

Enter the SSL parameters as follows: <keyword>=<value>. Parameters are separated by "&".

Example code:

```
C:\SoftwareAG\EntireX\examples\ACI\conversational\C\convSvr -localhost:1958:SSL ←
-cAClass -sASERVER -vASERVICE -x
"VERIFY_SERVER=N&TRUST_STORE=C:\SoftwareAG\EntireX\etc\ExxCACert.pem"
```



Caution: If stub tracing level is > 1, unencrypted contents of the send/receive buffers are exposed in the trace.

For information on the parameters see *Running Broker with SSL or TLS Transport* in the platform-specific administration documentation.

Setting the Timeout for the Transport Method

The timeout settings of the transport layers are independent of the broker's timeout settings, which are set by the application in the `WAIT` field of the broker ACI control block.

If the transport layer is interrupted, communication between the Broker and the stub (i.e. client or server application) is interrupted as well. To prevent a client from waiting for a Broker reply indefinitely, set a timeout value for the transport method. The actual timeout for the procedure is then the Broker timeout (which is set by the application in the field `WAIT` (see *Broker ACI Fields* in the ACI Programming documentation) plus this value.

▶ To set a transport timeout value

- Set the environment variable `ETB_TIMEOUT`:

Value	Description
0	Infinite wait for the application.
<i>n</i>	Transport method waits additional time in seconds. Negative values are treated as <code>ETB_TIMEOUT=0</code> , i.e. infinite wait.
No environment variable defined	Transport method waits additional 20 seconds.

Limiting the TCP/IP Connection Lifetime

With transport methods TCP/IP and SSL, the broker stub establishes one or more TCP/IP connections to the brokers specified with `BROKER-ID`. These connections can be controlled by the transport-specific `CONNECTION-NONACT` attribute on the broker side, but also by the transport-specific environment variable `ETB_NONACT` on the stub side. If `ETB_NONACT` is not 0, it defines the non-activity time (in seconds) of active TCP/IP connections to any broker. See `ETB_NONACT` under *Environment Variables in EntireX*. Whenever the broker stub is called, it checks for the elapsed non-activity time and closes connections with a non-activity time greater than the value defined with `ETB_NONACT`.

Transport Non-activity Value	Description
0	Infinite lifetime until application is stopped.
<i>n</i> (seconds)	Transport connections with non-activity time greater than <i>n</i> will be closed.
Nothing set	Transport connections with non-activity time greater than 300s (default) will be closed.

Modifying the Hosts and Services Tables

▶ To add an entry to the hosts table

- Add a line similar to the following to the local hosts file:

```
100.100.1.1 ETB226 # ETB test host name
```

▶ To add an entry to the services table

- Add lines similar to the following to the local services file:

```
ETB226 18492/tcp # ETB test host name
ETB411 21234/tcp # ETB production host name
```

Tracing for Broker Stubs

The broker stubs provide an option for writing trace files.

▶ To switch on tracing for the broker stub

- Before starting the client application, set the environment variable `ETB_STUBLOG`:

Trace Value	Trace Level	Description
0	NONE	No tracing.
1	STANDARD	Traces initialization, errors, and all ACI request/reply strings.
2	ADVANCED	Used primarily by system engineers, traces everything from level 1 and provides additional information - for example the Broker ACI control block - as well as transport information.
3	SUPPORT	This is full tracing through the stub, including detailed traces of control blocks, message information, etc.

Example:

```
ETB_STUBLOG=2
```

If the trace level is greater than 1, unencrypted contents of the send/receive buffers may be exposed in the trace.

Trace output, file *<thread-id>.etb*, is written to the trace directory. The location of the trace file depends on the settings of environment variable `%USERPROFILE%`, for example:

```
C:\Documents And Settings\\My Documents\Software AG\EntireX
```

See *Trace Directory* under *Directories as Used in EntireX* in the general administration documentation.

Remember to switch off tracing to prevent trace files from filling up your disk.

▶ To switch off tracing for the broker stub

- Set the environment variable `ETB_STUBLOG` to `NONE` or delete it.

Support of Clustering in a High Availability Scenario

EntireX Broker supports clustering in a high-availability scenario, using the environment variable `ETB_SOCKETPOOL`. See *Environment Variables in EntireX* in the general administration documentation. This section covers the following topics:

- [Introduction](#)
- [Exceptions](#)
- [Default](#)

See also *High Availability in EntireX*.

Introduction

A TCP/IP connection established between stub and broker is not exclusively assigned to a particular thread. With multithreaded applications, two or more threads may use the same connection. On the other hand, if a connection is busy, another new one is created to exchange data.

In order to access the same broker instance in a clustering environment, an affinity between application thread and TCP/IP connection is needed to always use the same connection within an application thread. Therefore, an environment variable is evaluated to control the handling of TCP/IP connections.

If environment variable `ETB_SOCKETPOOL` is set to "OFF" (`ETB_SOCKETPOOL=OFF`), an affinity between threads and TCP/IP connections is established. All requests to one particular broker will use the same TCP/IP connection. `ETB_SOCKETPOOL` controls all TCP/IP connections.

Exceptions

Broker attribute `CONNECTION-NONACT` is used by the broker to close TCP/IP connections after the elapsed non-activity time. Omit this attribute to keep the TCP/IP connection alive.

Default

`ETB_SOCKETPOOL=ON` is the default setting. In this case, an established broker connection can be used by any thread if the connection is not busy.

14 Broker Command-line Utilities

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EntireX Broker provides the following internal services: Command Service, Information Service and Administration Service, which can be used to administer and monitor brokers and RPC servers. Because these services are implemented internally, nothing has to be started or configured. You can use these services immediately after starting EntireX Broker.

etbinfo

Queries the Broker for different types of information, generating an output text string with basic formatting. This text output can be further processed by script languages. `etbinfo` uses data descriptions called profiles to control the type of data that is returned for a request. `etbinfo` is useful for monitoring and administering EntireX Broker efficiently, for example how many users can run concurrently and whether the number of specified message containers is large enough.

Although basic formatting of the output is available, it is usually formatted by script languages or other means external to the Broker.

- [Running the Command-line Utility](#)
- [Command-line Parameters](#)
- [Command-line Parameters from File](#)
- [Profile](#)
- [Format String](#)

Running the Command-line Utility

In a Windows environment, run the command-line utility with `etbinfo`. If the environment variable `LOGNAME` is not set, you must use the `-x` option (see below) to provide a user ID if the Broker is running with EntireX Security. `etbinfo` is located in directory `<drive>:\SoftwareAG\EntireX\bin`.

Command-line Parameters

The table below explains the command-line parameters. The format string and profile parameters are described in detail following the table. All entries in the Option column are case-sensitive.

Option	Command-line Parameter	Req/ Opt	Explanation
-b	brokerid	R	Broker identifier, for example <code>localhost:1971:TCP</code> .
-c	class	O	Class as selection criterion.
-C	csvoutput	O	Comma-separated values, suitable for input into a spreadsheet or other analysis tool. Any format string specified by means of format string or profile command-line parameters is ignored.

Option	Command-line Parameter	Req/ Opt	Explanation
-d	object	R	<p>Possible values:</p> <p>Object Provides Info on</p> <p>BROKER Broker.</p> <p>CLIENT Client.</p> <p>CMDLOG-FILTER Command log filter.</p> <p>CONVERSATION Conversation.</p> <p>NET Entire Net-Work transport.</p> <p>PARTICIPANT Participant.</p> <p>POOL-USAGE Broker pool usage.</p> <p>PSF Unit-of-work status.</p> <p>PSFADA Adabas persistent store.</p> <p>PSFCTREE c-tree persistent store.</p> <p>PSFDIV DIV persistent store.</p> <p>PSFFILE FILE persistent store.</p> <p>PUBLICATION Publication.</p> <p>PUBLISHER Publisher.</p> <p>RESOURCE-USAGE Broker resource usage.</p> <p>SECURITY EntireX Security.</p> <p>SERVER Server.</p> <p>SERVICE Service.</p> <p>SSL SSL transport.</p> <p>STATISTICS Broker statistics.</p> <p>SUBSCRIBER Subscriber.</p> <p>TCP TCP transport.</p> <p>TOPIC Topic.</p> <p>USER Participant (short).</p> <p>WORKER Worker.</p> <p>WORKER-USAGE Worker usage.</p>
-e	recv class	O	Receiver's class name. This selection criterion is valid only for object PSF.
-f	<i>Format String</i>	O	Format string how you expect the output. See <i>Profile</i> .
-g	recv service	O	Receiver's service name. This selection criterion is valid only for object PSF.
-h	help	O	Prints help information.
-i	convid	O	Conversation ID as selection criterion. Only valid for object CONVERSATION.

Option	Command-line Parameter	Req/ Opt	Explanation
-I	conv type	O	Conversation's type.
-j	recv server	O	Receiver's server name. This selection criterion is valid only for object PSF.
-k	recv token	O	Receiver's token. This selection criterion is valid only for object PSF.
-l	level	O	The amount of information displayed: FULL All information. SHORT User-specific information.
-m	recv userid	O	Receiver's user ID. This selection criterion is valid only for object PSF.
-n	server name	O	Server name. This selection criterion is valid only for the objects SERVER, SERVICE or CONVERSATION.
-p	file	O	Here you can specify a file that defines the layout of the output. There are default files you can modify or you can use your own. The default files are: BROKER CLIENT CLOGFLT CONV NET POOL PSF PSFADA PSFCTREE PSFDIV PSFFILE PUBLIC PUBSHR RESOURCE SECURITY SERVER SERVICE SSL STATIS SUBSCBR TCP TOPIC USER WORKER WKRUSAGE See Profile .
-q	puserid	O	Physical user ID. This selection criterion is valid only for objects CLIENT, SERVER, CONVERSATION, SUBSCRIBER, PUBLISHER or PUBLICATION. Note: Must be a hex value.
-P	publication id	O	Publication ID. This selection criterion is valid only for object PUBLICATION.
-r	sec	O	Refresh information after seconds.
-s	service	O	Service. This selection criterion is valid only for objects SERVER, SERVICE or CONVERSATION.
-S	"sslparms"	O	When using SSL transport.
-t	token	O	This selection criterion is valid only for objects CLIENT, SERVER, SERVICE, CONVERSATION, SUBSCRIBER, PUBLISHER, PUBLICATION or TOPIC.
-T	topic	O	Topic name. This selection criterion is valid only for objects PUBLICATION, SUBSCRIBER, PUBLISHER, or TOPIC.
-u	userid	O	User ID. This selection criterion is only valid for the display types CLIENT, SERVER, SERVICE, CONVERSATION, SUBSCRIBER, PUBLISHER, PUBLICATION or TOPIC.

Option	Command-line Parameter	Req/ Opt	Explanation
-U	subscr type	O	Subscriber's subscription type. This selection criterion is valid only for object SUBSCRIBER.
-v	UOW status	O	Unit of work status. This selection criterion is valid only for object PSF.
-w	UOW ID	O	Unit of work ID. This selection criterion is valid only for object PSF.
-x	userid	O	User ID. For security purposes.
-y	password	O	Password. For security purposes.
-z	token	O	Used with <code>userid</code> to uniquely identify a caller to Command and Information Services.

Command-line Parameters from File

`etbinfo` supports an alternative method of passing command-line parameters.

If the environment variable `INF_ATTR` is set, the content is interpreted as a file name. If no command-line parameters are given, the command `etbinfo` evaluates the content of the file. Example:

```
-blocalhost:3930:TCP
-dBROKER
```

Profile

If you do not use the profile option or a format string, your output will be an unformatted list with all columns of that display type. To display specific columns, specify a profile that includes only those columns.

The following default sample profiles include all the columns defined for each display type:

- BROKER ■ PSFCTREE ■ SERVICE
- CLIENT ■ PSFDIV ■ SSL
- CLOGFLT ■ PSFFILE ■ STATIS
- CONV ■ PUBLIC ■ SUBSCBR
- NET ■ PUBSHR ■ TCP
- POOL ■ RESOURCE ■ TOPIC
- PSF ■ SECURITY ■ USER
- PSFADA ■ SERVER ■ WKRUSAGE
- WORKER

You can either delete the columns not required or copy the default profile and modify the order of the columns. Ensure that the column names have a leading "%". Column names can be written in one line or on separate lines. The output is always written side by side.

Location of Profiles

On Windows, the profiles are contained in directory `<drive>:\SoftwareAG\EntireX\etc` and are named `broker.pro`, `client.pro` etc.

Example 1

Profile for object SERVICE: SERVICE.

```
etbinfo -b ETB001 -d SERVICE -p service.pro -l FULL
```

The following list is displayed:

```
SAG          ETBCIS      INFO
1 0 16 86400 0 31647 0 00 00 00 00 0 0
SAG          ETBCIS      USER-INFO
2 0 16 86400 0 31647 0 00 00 00 00 0 0
SAG          ETBCIS      CMD
6 0 16 86400 0 31647 0 00 00 00 00 0 0
```

Example 2

Your own profile: MYPROF

```
etbinfo -b ETB001 -d SERVICE -p my_service.pro
```



Note: In this case, `my_service.pro` contains:`%4.4SERVERCLASS %SERVERNAME`

The following list is displayed:

```
ACLA      ASERVER
BCLA      BSERVER
CCLA      CSERVER
```

Sample Profiles for etbinfo

You can find the sample profiles for `etbinfo` in your `<drive>:\SoftwareAG\EntireX\EntireX\config` directory.

Format String

The format string, if specified, will override the use of a profile. The format string is built like a `printf()` in C language. The string must be enclosed in quotation marks. You can specify the columns by using a “%” and the column name. The column name must contain letters only. Numeric characters are not allowed. You can specify the length of column output by using a format precision, as in the ANSI-C `printf()` function. The column name must be followed by a blank. For example:

```
etbinfo -b ETB001 - BROKER -f "%12.12CPLATNAME    %NUM-SERVER    %NUM-CLIENT"
```

which produces the following output, for example:

```
MVS/SP 7.04 30 100
```

You can also use an arbitrary column separator, which can be any character other than “%”. You can use `\n` for a new line in the output and `\t` for a tabulator in the format string or profile. For example:

```
etbinfo -b ETB001 -d SERVER -f "UserID: %5.5USER-ID Token: %5.5TOKEN"
```

which produces:

```
UserID: HUGO  Token: MYTOK
UserID: EGON  Token:
UserID: HELMU Token: Helmu
```

If you want to structure your output a little more, you can operate with the `\n` or `\t` character. For example:

```
etbinfo -b ETB001 -d SERVICE -f "Class:%5.5SERVER-CLASS \n\tName:%5.5SERVER-NAME ↵
\n\tService:%5.5SERVICE"
```

which produces:

```
Class:DATAB
  Name:DB10
  Service:Admin
Class:PRINT
  Name:LPT1
  Service:PRINT
...
```

etbcmd

Allows the user to take actions - for example purge a unit of work, stop a server, shut down a Broker - against EntireX Broker.

- [Running the Command-line Utility](#)
- [Command-line Parameters](#)
- [Command-line Parameters from File](#)
- [List of Commands and Objects](#)
- [Examples](#)

Running the Command-line Utility

In a Windows environment, run the command-line utility with `etbcmd`. If the environment variable `LOGNAME` is not set, you must use the `-x` option (see below) to provide a user ID if the Broker is running with EntireX Security. `etbcmd` is located in the directory `<drive>:\SoftwareAG\EntireX\bin`.

Command-line Parameters

The table below explains the command-line parameters. All entries in the **Option** column are case-sensitive.

Command-line Parameter	Option	Parameter	Req/ Opt	Explanation
brokerid	-b	e.g. ETB001	R	Broker ID.
command	-c	<ul style="list-style-type: none"> ■ ALLOW-NEUOWMSGs ■ CLEAR-CMDLOG-FILTER ■ CONNECT-PSTORE ■ DISABLE-ACCOUNTING ■ DISABLE-CMDLOG-FILTER ■ DISABLE-CMDLOG ■ DISABLE-DYN-WORKER ■ DISCONNECT-PSTORE ■ ENABLE-ACCOUNTING ■ ENABLE-CMDLOG-FILTER ■ ENABLE-CMDLOG ■ ENABLE-DYN-WORKER ■ FORBID-NEUOWMSGs ■ PING 	R	Command to be performed. See List of Commands and Objects below.

Command-line Parameter	Option	Parameter	Req/ Opt	Explanation
		<ul style="list-style-type: none"> ■ PRODUCE-STATISTICS ■ PURGE ■ RESET-USER ■ RESUME ■ SET-CMDLOG-FILTER ■ SHUTDOWN ■ START ■ STATUS ■ STOP ■ SUBSCRIBE ■ SUSPEND ■ SWITCH-CMDLOG ■ TRACE-FLUSH ■ TRACE-OFF ■ TRACE-ON ■ TRAP-ERROR ■ UNSUBSCRIBE 		
object type	-d	<ul style="list-style-type: none"> ■ BROKER ■ CONVERSATION ■ PARTICIPANT ■ PSF ■ SUBSCRIBER ■ SECURITY ■ SERVER ■ SERVICE ■ TRANSPORT 	R	<p>The object type to be operated on. See <i>List of Commands and Objects</i> below.</p> <p>Within EntireX Broker nomenclature, a participant is an application implicitly or explicitly logged on to the Broker as a specific user. A participant could act as client, server, publisher or subscriber.</p>
	-e	errornumber	O	Error number being trapped.
	-E		O	Exclude attach servers from service shutdown.
help	-h		O	Prints help information.
class/server/service	-n	class/server/service	O	Service triplet.
option	-o	<ul style="list-style-type: none"> ■ IMMED ■ QUIESCE 	O	Command option.

Command-line Parameter	Option	Parameter	Req/ Opt	Explanation
		■ LEVEL <i>n</i> , where <i>n</i> =1-8		
puserid	-p	puserid	O	Physical User ID. For SERVER and PARTICIPANT objects only. This must be a hex value.
sslparms	-s	SSL parameters	O	When using SSL transport.
seqno	-S	sequence number	O	Sequence number of participant.
token	-t	token	O	Token. For PARTICIPANT and SUBSCRIBER objects only.
topic	-T	topic	O	Topic name. For SUBSCRIBER object only.
uowid	-u	uowid	O	Unit of work ID. For PSF object only.
userid	-U	userid	O	User ID. For PARTICIPANT and SUBSCRIBER objects only.
secuserid	-x	userid	O	User ID for security purposes.
transportid	-X	Transport ID	O	One of the following: COM NET SSL S <i>nn</i> TCP T <i>nn</i> . See table below.
secpassword	-y	password	O	Password for security purposes.

Transport ID Values

This table explains the possible values for parameter `transportid`:

Transport ID	Explanation
COM	all communicators
NET	NET transport communicator
SSL	all SSL communicators
S00	SSL communicator 1
S01	SSL communicator 2
S02	SSL communicator 3
S03	SSL communicator 4
S04	SSL communicator 5
TCP	all TCP/IP communicators
T00	TCP/IP communicator 1
T01	TCP/IP communicator 2
T02	TCP/IP communicator 3
T03	TCP/IP communicator 4
T04	TCP/IP communicator 5

Command-line Parameters from File

etbcd supports an alternative method of passing command-line parameters.

List of Commands and Objects

This table lists the available commands and the objects to which they can be applied.

Command	Object								
	BROKER	CONVERSATION	PARTICIPANT	PSF	SECURITY	SERVER	SERVICE	SUBSCRIBER	TRANSPORT
ALLOW-NEUOWMSGS				x					
CLEAR-CMDLOG-FILTER	x								
CONNECT-PSTORE				x					
DISABLE-ACCOUNTING	x								
DISABLE-CMDLOG-FILTER	x								
DISABLE-CMDLOG	x								
DISCONNECT-PSTORE				x					
ENABLE-ACCOUNTING	x								
ENABLE-CMDLOG-FILTER	x								
ENABLE-CMDLOG	x								
FORBID-NEUOWMSGS				x					
PING	x								
PRODUCE-STATISTICS	x								
PURGE				x					
RESET-USER					x				
SET-CMDLOG-FILTER	x								
SHUTDOWN	x	x	x			x	x		
START									x
STATUS									x
STOP									x
SUBSCRIBE								x	
SWITCH-CMDLOG	x								
TRACE-OFF	x			x	x				
TRACE-ON	x			x	x				
UNSUBSCRIBE								x	



Note: Object type `TRANSPORT` applies to operating systems z/OS and z/VSE only.

Examples

Example	Description
<code>etbcmd -b etb001 -h</code>	Displays ETBCMD help text.
<code>etbcmd -b etb001 -d BROKER -c TRACE-OFF</code>	Turns Broker tracing off.
<code>etbcmd -b etb001 -d BROKER -c TRACE-ON -o LEVEL2</code>	Sets Broker trace level to 2.
<code>etbcmd -b etb001 -d BROKER -c SHUTDOWN</code>	Performs Broker shutdown.
<code>etbcmd -b etb001 -d SERVICE -c SHUTDOWN -o IMMED -n ACLASS/ASERVER/ASERVICE</code>	Shutdown service CLASS=AClass, SERVER=AServer, SERVICE=AService. See also <code>SHUTDOWN SERVICE</code> under <i>Broker Command and Information Services</i> for more information on shutdown options.
	Create list of servers and shutdown specific server in two steps (first step uses <code>etbinfo</code>). See also <code>SHUTDOWN SERVER</code> under <i>Broker Command and Information Services</i> .
<code>etbinfo -b etb001 -d SERVER -l FULL -f"%USER-ID %SEQNO"</code>	1. Determine a list of all servers with sequence numbers.
<code>etbcmd -b etb001 -d SERVER -c SHUTDOWN -o IMMED -S32</code>	2. Shutdown server with sequence number 32.
<code>etbcmd -b etb001 -d BROKER -c PING</code>	Performs an EntireX ping against the Broker.
<code>etbcmd -b etb001 -d PSF -c DISCONNECT-PSTORE</code>	Disconnects the Broker PSTORE.
<code>etbcmd -b etb001 -d PSF -c CONNECT-PSTORE</code>	Connects the Broker PSTORE.
<code>etbcmd -b etb001 -d PSF -c PURGE -u 100000000U00001A</code>	Purges a unit of work.
<code>etbcmd -b etb001 -d PSF -c ALLOW-NEUOWMSGS</code>	Allows new units of work to be stored.
<code>etbcmd -b etb001 -d PSF -c FORBID-NEUOWMSGS</code>	Disallows new units of work to be stored.
<code>etbcmd -b etb001 -d SUBSCRIBER -c SUBSCRIBE -U U1 -t t1 -T NYSE</code>	Subscribes subscriber to topic NYSE.
<code>etbcmd -b etb001 -d SUBSCRIBER -c UNSUBSCRIBE -U U1 -t t1 -T NYSE</code>	Unsubscribes subscriber from topic NYSE.

etbsrv

The broker command-line utility `etbsrv` monitors and controls all local brokers; remote brokers can also be monitored.

- [Starting a Broker](#)
- [Pinging a Broker](#)
- [Pinging an RPC Server](#)
- [Restarting a Broker](#)
- [Stopping a Broker](#)
- [Enabling EntireX Security](#)
- [Disabling EntireX Security](#)

Starting a Broker

Use command `BROKER START` to start a specified broker:

```
etbsrv BROKER START "ETB001"
```

Pinging a Broker

Use command `BROKER PING` to display the status of a specified local or remote broker. Return code 0 means the broker is running; any other value means the broker has stopped. See *Component Return Codes in EntireX* under *Error Messages and Codes*. Example:

```
etbsrv BROKER PING "ETB001"
```

Enter the command without specifying a broker to display the status of all brokers.

The information is the same as displayed using System Management Hub.

Pinging an RPC Server

Use command `BROKER PINGRPC <brokerid> <class/server/service>` to display the status of a specified RPC server. Return code 0 means the RPC server is running; any other value means the RPC server has stopped. See *Component Return Codes in EntireX* under *Error Messages and Codes*. Example:

```
etbsrv BROKER PINGRPC "ETB001" "SAG/ETBCIS/RPCCIS"
```

The information is the same as displayed using System Management Hub.

Restarting a Broker

Use command `etbsrv BROKER RESTART` to stop and restart a specified broker. Example:

```
BROKER RESTART "ETB001"
```

Stopping a Broker

Use command `BROKER STOP` to stop a local broker. Example:

```
etbsrv BROKER STOP "ETB001"
```

Enabling EntireX Security

Activate security with command `etbsrv SECURITY ENABLE`; once activated, security can only be deactivated with command `SECURITY DISABLE`.

To enable automatic scripts to execute administration service commands without having to enter a password, set the option `TRUSTED-USER=YES` when administration service security is activated.

```
etbsrv SECURITY ENABLE TRUSTED-USER=YES
```

Disabling EntireX Security

Disable security with command `etbsrv SECURITY DISABLE`.

15 Administration Service Commands

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The administration service monitors and controls all local brokers; remote brokers can also be monitored. The administration service is addressed via the System Management Hub or the administration service command-line utility `etbsrv`. To run the commands from utility `etbsrv`, System Management Hub is not required. This feature was designed to be used in a clustering environment, but can also be used in a standard environment.

Starting a Broker

Use command `BROKER START` to start a specified broker:

```
etbsrv BROKER START "ETB001"
```

Pinging a Broker

Use command `BROKER PING` to display the status of a specified local or remote broker. Return code 0 means the broker is running; any other value means the broker has stopped. See *Component Return Codes in EntireX* under *Error Messages and Codes*. Example:

```
BROKER PING "ETB001"
```

Enter the command without specifying a broker to display the status of all brokers.

The information is the same as displayed using System Management Hub.

Pinging an RPC Server

Use command `BROKER PINGRPC <brokerid> <class/server/service>` to display the status of a specified RPC server. Return code 0 means the RPC server is running; any other value means the RPC server has stopped. See *Component Return Codes in EntireX* under *Error Messages and Codes*. Example:

```
BROKER PINGRPC "ETB001" "SAG/ETBCIS/RPCCIS"
```

The information is the same as displayed using System Management Hub.

Restarting a Broker

Use command `BROKER RESTART` to stop and restart a specified broker. Example:

```
BROKER RESTART "ETB001"
```

Stopping a Broker

Use command `BROKER STOP` to stop a local broker. Example:

```
etbsrv BROKER STOP "ETB001"
```

Enabling EntireX Security

Activate security with command `etbsrv SECURITY ENABLE`; once activated, security can only be deactivated with command `SECURITY DISABLE`.

To enable automatic scripts to execute administration service commands without having to enter a password, set the option `TRUSTED-USER=YES` when administration service security is activated.

```
etbsrv SECURITY ENABLE TRUSTED-USER=YES
```

Disabling EntireX Security

Disable security with command `etbsrv SECURITY DISABLE`.

16 Administering the Attach Manager under Windows

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EntireX includes an Attach Manager (ATM) for UNIX and Windows. This is used to start servers if a client requests a particular service from the Broker, but a server for that service is not active.

Prerequisites

The Attach Manager needs the following:

- An active task registered at the Broker. As of EntireX 8.1 SP2, the ATM task is automatically launched on each computer where EntireX is installed (the default ATM). But it is also possible to skip this automatic launch and start the ATM manually.
- A list of services the ATM is responsible for, and information on how to start the corresponding server for a particular service. The Attach Manager can start only processes that are local to where it is running, that is, the process that is attached will be run from the command line. There is no restriction, however, on what the started command-line process does, including starting a remote process on another system that will REGISTER as the server that satisfies the attach request.
- A configuration file that contains the service list the ATM is responsible for, information on how to start the corresponding server and additional configuration parameter to control the ATM functionality.

Setting up the Attach Manager

If you do not need the ATM for your own services, you do not need to perform any configuration for the ATM. A default configuration file *AtmDefault.cfg.txt* comes with the EntireX installation and contains the necessary configuration to start the EntireX sample servers. The file is located in the EntireX *config* directory. In the current version of EntireX, the ATM is not launched automatically by default. If you want to activate an automatic launch, just rename the configuration file *AtmDefault.cfg.txt* to *AtmDefault.cfg*. With the next reboot ATM is then launched automatically.

The Attach Manager is located in the *bin* subdirectory under the installed EntireX directory. The name of the executable is *exxatm.exe*. If you need to start an ATM manually for any reason, start it using this executable. You can start multiple ATMs, for example to run them under different accounts. But all ATM instances should share the same configuration file. The configuration file is organized in so-called sections to support multiple ATM instances. Without further command line arguments, the ATM uses the default section within the default configuration file. See [Operating the Attach Manager](#) for possible command line arguments.

The syntax of the text-based configuration file is simple and is very similar to a Windows INI file.

Syntax Element	Description
;	Lines beginning with a semicolon are comment lines.
[]	Lines that contain text in square brackets are section headers.
Keyword=Value	Lines that are of the form Keyword=Value are keyword lines.



Note: Any of the values of the keywords in the configuration file can be set as environment variables.

There are three different types of sections in the configuration file:

- The ATM section to configure a particular ATM instance. The ATM section with the name "Default" is the default section. If no section with the name "Default" is found, the first ATM section in the file is the default section. Each ATM section contains the configuration parameters of the corresponding ATM instance and has one related Service List section, which refers to the services that this ATM supports. Each ATM section needs exactly one ATM server attaching the related servers if requested.
- The Service List section contains a list of names of Service sections. The name of the Service List section is the name of the related ATM section appended by "_Services".
- The Service section configures a service, which consists of the service name and how to start the corresponding server.

The general structure of the configuration file is the following:

```
[Default]
; The parameters of the Default ATM
[Default_Services]
SERVICE1=
SERVICE2=
[SERVICE1]
; The parameters for SERVICE1
[SERVICE2]
; The parameters for SERVICE1
```

Parameters of the ATM Section

These sections define the Attach Manager itself and contain the keywords indicated in this table. There can be up to 16 of these sections.

Keyword	Definition and Value	Format	Example	Notes
BrokerID=	The Broker that ATM will communicate with and answer attach requests. Any valid ACI BROKERID value is allowed.	A32	BrokerID=server1:1971:TCP	
SSLParms=	Secure Sockets Layer Parameters for Brokers that use SSL Transport.	A512	SSLParms=VERIFY_SERVER=N&TRUST_STORE=C:\\Temp\\ExxCACert.pem	
ServerClass= ServerName= Service=	The CLASS/SERVER/SERVICE names that can be used by ATM to send commands to ATM. (See details of this feature.) The CLASS/SERVER/SERVICE name needs to be defined in the <i>Broker Attributes</i> in the platform-independent administration documentation.	A32 [for all keywords]	ServerClass=System ServerName=DefaultMain Service=Command	
UserID=	The User ID of the ATM.	A32	UserID=atman	
Token=	The Token of the ATM (used for unique identification of the User ID). There is a special value of {GeneratedToken} which will generate a unique 32-byte value for the ATM.	A32	Token=atm Token={GeneratedToken}	
Password=	Password for the User ID.	A32	Password=atman	
WaitTime=	During the specified time, the Attach Manager waits for a response. After expiration of the time, the Attach Manager receives a timeout. This is used as the WAIT time on the ATM's RECEIVE call.	A8 [identical to Broker control block WAIT parameter]	WaitTime=5M Default: 60S	
RecvLength=	Size of the buffer that is available for receiving orders.	I4 [identical to Broker control block RECEIVE-LENGTH parameter]	RecvLength=12000 Default: 8000	

Keyword	Definition and Value	Format	Example	Notes
HistoryFile=	File name for logging orders that have been received for restarting. If this keyword is not specified, no file is written. This can be any valid file name.	Valid path name for dependent platform. See example.	HistoryFile=%TEMP%\Default.his	
HistoryFileMode=	When starting the Attach Manager, you can decide here whether the current file is to be overwritten or not.	w or a+t	HistoryFileMode=w	File is newly opened for writing; the old file is deleted.
			HistoryFileMode=a+t	Writing of the old file is continued.
LogFile=	Log information is logged here about the current status of the Attach Manager. If this keyword is not specified, no file is written.	Valid path name for dependent platform. See example.	LogFile=%TEMP%\Default1.log	
LogFileMode=	When starting the Attach Manager, the administrator can decide whether the current file is to be overwritten or not. The file can get very large.	w or a+t	LogFileMode=w	File is newly opened for writing; the old file is deleted.
			LogFileMode=a+t	Writing of the old file is continued.
Sleep=	If the Attach Manager cannot register successfully during startup, or if a connection is broken, the Attach Manager waits this specified time in seconds and then tries again. You can limit the number of connection attempts, using the keyword Retries= <i>n</i> .	I4	Sleep=120	
Retries=	If registration fails, the number of subsequent registration attempts can be limited. the keyword Sleep determines the wait time	I4	Retries=0	Default value is 0.

Keyword	Definition and Value	Format	Example	Notes
	before a new registration attempt. Setting Retries=0 deactivates this functionality.			
ShutdownBy UserRequest=	When set to 1, the ATM can be stopped when a command is sent to it to shut down. If it is set to zero, it will restart automatically.	See example.	Values: 0: Attach Manager restarts. The configuration file is read anew. 1: Attach Manager terminates itself.	

Parameters of the Service List Section

This section names the Service sections that will be used to define the services that will be attached. The prefix of the name of the section must match a specific instance of the AttachManager(n) sections.

Example: Assume there are three services to be attached. They can be logically defined as follows:

```
Default_Services]
payroll=
inventory=
qualitycontrol=
```

Therefore, there will be three optional sections following: [payroll], [inventory], and [qualitycontrol].

Parameters of the Service Section

There can be any number of Service sections attached to an ATM by means of its corresponding Service List section. The Service sections are used to define the actual commands that will be issued by ATM to attach servers to respond to Broker requests

The following are the keywords that can be used:

Keyword	Definition	Format	Example
ServerClass= ServerName= Service=	The CLASS/SERVER/SERVICE name of the service to be attached.	A32	ServerClass=AClass ServerName=AServer Service=AService
Min=	The minimum number of servers that should be active.	I4	Min=3

Keyword	Definition	Format	Example
Max=	The maximum number of servers that should be active.	I4	Max=7
Increment=	The number that should be started when a request is made, up to the number indicated by Max=	I4	Increment=1
Command=	Command-line command to be issued that will start the service.	Specifies (a) the fully qualified path to the location of the executable to be run and (b) the options for that executable. See example.	Command=c:\server\bcos32.exe

Example from table above: If there are no instances of the service `AClass:AServer;AServiceRegistered`, the command indicated in the `Command=` keyword will be issued three times.

Sample Configuration File



Note: A sample configuration file is provided in the `\config` folder of EntireX. This sample defines two ATMs: `Default` and `AttachManager2`. The default ATM supports only the services related to `Default`.

```
[Default]
;
; Specify the broker to which the Attach Manager attaches and
; the channel on which the Attach Manager listens for command
; requests.
;
BrokerID=localhost:1971:TCP
ServerClass=System
ServerName=DefaultMain
Service=Command
UserID=%USERNAME%
Token={GeneratedToken}
Password=Hugo
WaitTime=30s
RecvLength=12000

; Activities will be written to the history file (optional)
HistoryFile=%TEMP%\Default.his
HistoryFileMode=a+t

; Log messages will be written to the log file (optional)
LogFile=%TEMP%\Default.log
; Append to an existing file
```

```
;LogFileMode=a+t
; Create a new file
LogFileMode=w

Sleep=10
Retries=0

ShutdownByUserRequest=1

;
;
; Default's services
;
[Default_Services]
AServer=
BServer=
;
[AServer]
ServerClass=AClass
ServerName=ASERVER
Service=ASERVICE
Min=2
Max=3
Increment=1
Command=bcos32 -c<ServerClass> -s<ServerName> -v<Service> -b<BrokerID> -i500
;
[BServer]
ServerClass=BCLASS
ServerName=BSERVER
Service=BSERVICE
Min=1
Max=1
Increment=1
Command=bcos32 -c<ServerClass> -s<ServerName> -v<Service> -b<BrokerID> -i750
[AttachManager2]
;
; Specify the broker to which the Attach Manager attaches and
; the channel on which the Attach Manager listens for command
; requests.
;
BrokerID=localhost:1971:TCP
ServerClass=System
ServerName=AttachManager2Main
Service=Command
UserID=%USERNAME%
Token={GeneratedToken}
Password=Hugo
WaitTime=30s
RecvLength=12000

; Activities will be written to the history file (optional)
HistoryFile=%TEMP%\AttachManager2.his
```



```
HistoryFileMode=a+t

; Log messages will be written to the log file (optional)
LogFile=%TEMP%\AttachManager2.log
; Append to an existing file
;LogFileMode=a+t
; Create a new file
LogFileMode=w

Sleep=10

ShutdownByUserRequest=1
;
; AttachManager2's services
;
[AttachManager2_Services]
CServer=
;
[CServer]
ServerClass=CCLASS
ServerName=CSERVER
Service=CSERVICE
Min=1
Max=1
Increment=1
Command=bcos32 -c<ServerClass> -s<ServerName> -v<Service> -b<BrokerID> -i1000
```

Operating the Attach Manager under Windows

Under normal circumstances, no manual operation is not necessary if the default ATM satisfies your needs. However, if you need to run multiple ATMs in your environment, this section describes how to perform the necessary operations.

- [Starting the Attach Manager](#)
- [Stopping the Attach Manager](#)
- [Logging the Attach Manager](#)

- [Attach Manager Processing](#)

Starting the Attach Manager

▶ To start an Attach Manager

- Either from the *bin* directory of EntireX (or from any directory if the *bin* directory is in the PATH), enter the following command:

```
exxatm -F<full-path of Configuration file> -N<AttachManager1> -N<AttachManager2> ↵  
...
```



Notes:

1. With the `-N` argument you specify the ATM section for which the Attach Manager is responsible for. If this argument is omitted the attach manager is responsible for the default section.
2. With the `-F` argument you specify the location of the configuration file. If this argument is omitted, the Attach Manager uses the default configuration file. All ATM instances should use the same configuration file, so we recommend you use the default file for the default ATM.
3. The Attach Manager writes output to stdout. If you start the Attach Manager as a background process, stdout must be redirected to a file.

Stopping the Attach Manager

▶ To stop an Attach Manager

- Use the System Management Hub to stop any Attach Manager.

Each ATM corresponds to an particular broker and registers a command service defined with the configuration variables `ServerClass/ServerName/Service` in the ATM section. Select the service and press **Deregister** to terminate the ATM.

Logging the Attach Manager

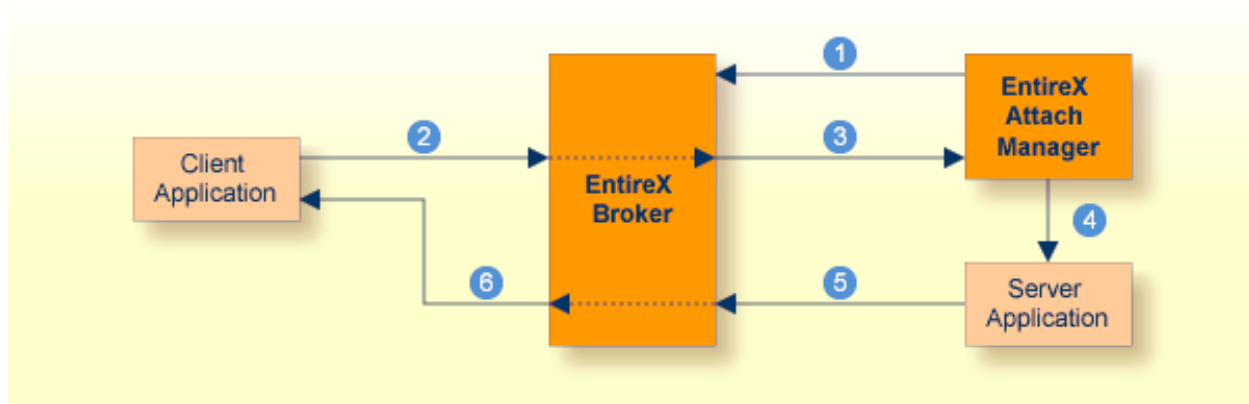
The ATM log file is defined by the ATM configuration parameter `LogFile`. If the Attach Manager is launched automatically, it writes additional log information to file `exxatm.out` in the EntireX subdirectory `config\etb\ETBSRV`.

In addition to the ATM log file, a history file is defined by the ATM configuration parameter `HistoryFile`. For each order to launch a service, the ATM writes a record into the history file. The history record has the following format:

- date and time

- the service name as defined in the ATM config file
- server name, server class and service
- number of active replicates (this number is greater than 0 only if all running replicates are busy while a new client requests the service)
- number of server lookups, that is, the number of clients requesting a new replicate of the server; this is greater than 1 only if two clients request a service in parallel
- replicate increment as defined in the ATM config file
- number of replicates actually launched; this differs from the increment only if the high watermark is exceeded

Attach Manager Processing



Key

- Step 1: Attach Manager registers with Broker, indicating that it will attach named services. These are called attach-managed services.
- Step 2: Client requests a service that is attach-managed. Server may or may not be active. If it is not, a server will be started (attached).
- Step 3: Attach request comes from the Broker.
- Step 4: Attach Manager issues command to start the server application.
- Step 5: Server application issues a LOGON to the Broker, then issues REGISTER and RECEIVE. It gets message from client, processes the message, and responds.
- Step 6: Response from server is received by the client application.

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Setting up and Administering the Broker TCP Agent

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▪ Activating Tracing for the TCP Agent	238
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The Broker TCP Agent is a gateway to the broker whenever direct TCP/IP communication with the broker is not possible.

Under Windows, use the delivered batch file `<drive>:\SoftwareAG\EntireX\EntireX\bin\broker-agent.bat` to start the agent.

Common Scenarios

The most common scenarios for using the TCP Agent are where the Java security manager does not allow direct communication with the Broker. For example, an un-trusted Java applet can only open a TCP/IP connection to a Broker which is running on the same machine as the Web server.

Although in most cases the TCP Agent will be used from a Broker application written in Java, the TCP Agent can also be used from non-Java applications as long as the Broker stubs support TCP/IP.

Indirect TCP/IP Connections by the TCP Agent to Avoid Security Restrictions

The TCP Agent must be used when the Java client cannot open a TCP/IP connection to the EntireX Broker due to security or firewall settings. The most prominent case is the Java sandbox model, which permits a Java applet to open only TCP/IP connections to the machine where the Web server resides. If the EntireX Broker is running on a different machine, a TCP Agent has to be run on the Web server machine.

Using the TCP Agent

Class Name and Parameters

The TCP Agent is a standalone Java application. The class name which contains the `main` method is `com.softwareag.entirex.ba.BrokerAgent`.

Specify the following parameters in the order given in this table when the TCP Agent listens on a TCP/IP port:

Parameter	Explanation
1. Trace Option	Valid values: ON or OFF. Default: OFF. A dump of the buffers is written to standard output for diagnostic purposes.
2. Port Number	The port number the TCP Agent uses for incoming requests from Broker applications. This port number must be specified as part of the Broker ID in the Broker application.
3. Broker Address	The TCP Agent sends all requests to this Broker using any legal Broker ID as in EntireX Java. The TCP Agent will use direct TCP/IP communication if the address is of the form <code>Hostname</code> , <code>Hostname:Number</code> , or if it starts with <code>tcpip://</code>
4. Port Number for commands (optional)	The port number the TCP Agent uses for incoming commands.

Starting the TCP Agent

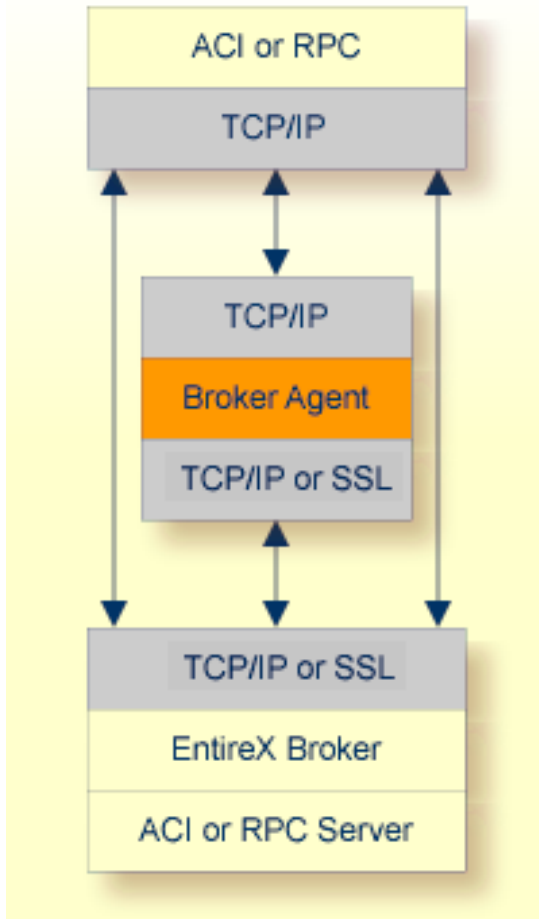
Under Windows, the EntireX distribution kit comes with a batch file to start the TCP Agent. Change the port number and the Broker address in file `<drive>:\SoftwareAG\EntireX\EntireX\bin\broker-agent.bat`.

Activating Tracing for the TCP Agent

Set the parameter Trace Option to "ON". See [Class Name and Parameters](#).

Architecture of the TCP Agent

The architecture of the TCP Agent is shown in the following picture:



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Setting up and Administering the Broker SSL Agent

- Common Scenarios 242
- Using the SSL Agent 242
- Activating Tracing for the SSL Agent 243
- Architecture of the SSL Agent 243

The Broker SSL Agent is a gateway to the broker whenever direct SSL or TLS communication with the broker is not possible.

Under Windows, use the delivered batch file `<drive>:\SoftwareAG\EntireX\EntireX\bin\sslbroker-agent.bat` to start the agent.

Common Scenarios

The most common scenarios for using the SSL Agent are where direct SSL communication to the Broker is not possible or it is not required by the network architecture.

Although in most cases the SSL Agent will be used from a Broker application written in Java, the SSL Agent can also be used from non-Java applications as long as the Broker stubs support SSL.

Using the SSL Agent

Class Name and Parameters

The SSL Agent is a standalone Java application. The class name is `com.softwareag.entirex.ba.SSLBrokerAgent`.

Specify the following parameters in the order given in this table when the SSL Agent listens on an SSL port:

Parameter	Explanation
1. Trace Option	Valid values: ON or OFF. Default: OFF. A dump of the buffers is written to standard output for diagnostic purposes.
2. Port Number	The port number the TCP Agent uses for incoming requests from Broker applications. Specify this port number as part of the broker ID in the broker application.
3. SSL Parameters	SSL parameters when the SSL Agent runs as an SSL server. SSL requires a (server) certificate with a private key. Specify with <code>key_store=filename</code> the file name of a Java keystore that contains the private key. SSL client authentication can be requested with the parameter <code>verify_client=yes</code> . In this case, specify with <code>trust_store=filename</code> the file name of a Java keystore containing the list of trusted certificate authorities that issued the client's certificate. The complete list of parameters could be <code>key_store=keystore&verify_client=yes&trust_store=castore</code> . Examples: <code>key_store=ExxJavaAppCert.jks trust_store=ExxCACert.jks</code> .

Parameter	Explanation
4. Password	The password which protects the private key. If the value -prompt is specified the password is read from standard input.
5. Broker Address	The SSL Agent sends all requests to this Broker using any legal Broker ID as in EntireX Java. The SSL Agent will use SSL communication if the address starts with <code>ssl://</code> .
6. Port Number for commands	The port number the SSL Agent uses for incoming commands from the System Management Hub.

Starting the SSL Agent

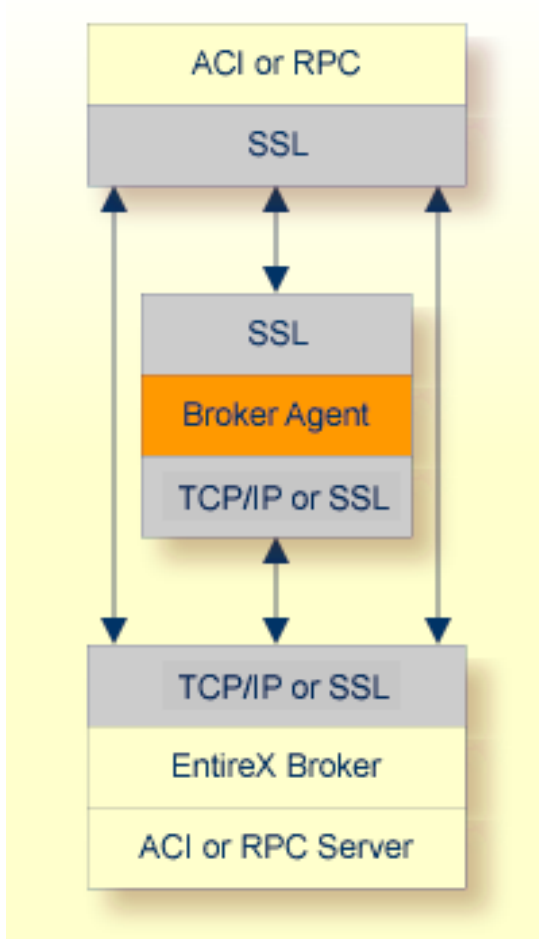
Under Windows, the EntireX distribution kit comes with a batch file to start the SSL Agent. Change the port number, the Broker address and the SSL parameters in file `<drive>:\SoftwareAG\EntireX\EntireX\bin\sslbrokeragent.bat`.

Activating Tracing for the SSL Agent

Set the parameter Trace Option to "ON". See [Class Name and Parameters](#).

Architecture of the SSL Agent

The architecture of the SSL Agent is shown in the following picture:



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Setting up and Administering the Broker HTTP(S) Agent

- HTTP(S) Tunneling with EntireX 246
- Configuring the HTTP(S) Agent 247
- Using Internationalization with the HTTP(S) Agent 249
- Activating Tracing for the HTTP(S) Agent 249

The Broker HTTP(S) Agent is a Java-based component that implements a Java servlet for servlet-enabled Web servers. It builds the bridge between a Web server and EntireX Broker in the intranet. This component was formerly referred to as “Tunnel Servlet”.

HTTP(S) Tunneling with EntireX

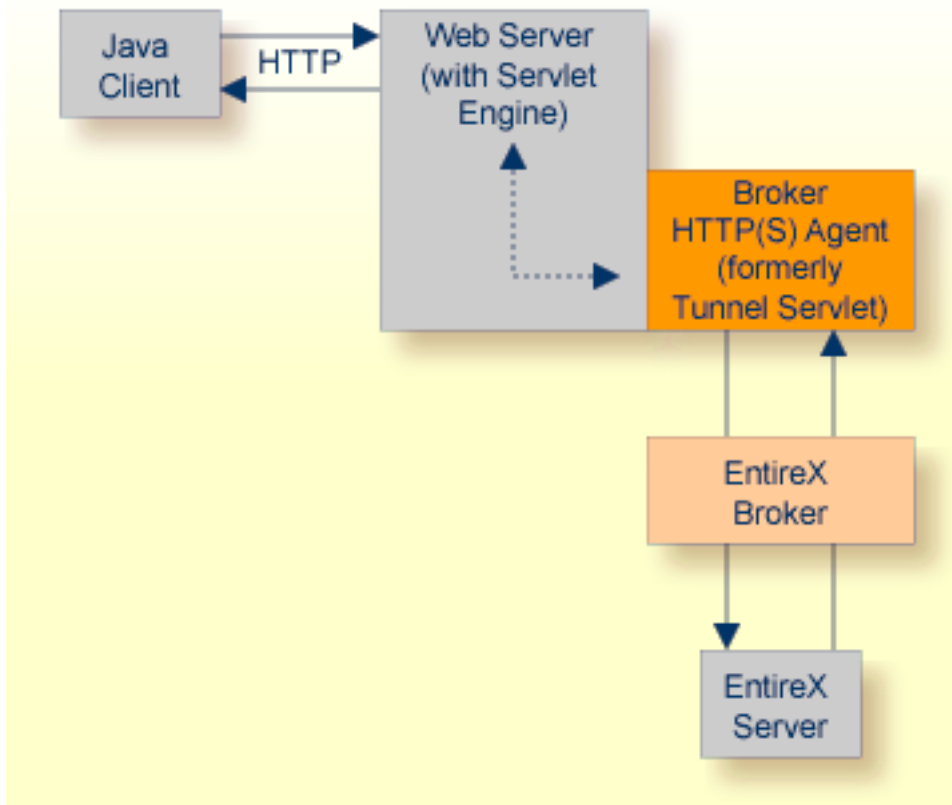
Introduction

When communicating with EntireX Broker over the internet, direct access to the EntireX Broker's TCP/IP port is necessary. This access is often restricted by proxy servers or firewalls. With EntireX, Java-based communication components can pass communication data via HTTP or HTTPS. This means a running EntireX Broker in the intranet is made accessible by a Web server without having the need to open additional TCP/IP ports on your firewall (HTTP tunneling). HTTP or HTTPS tunneling can also be used for Java RPC.

How the Communication Works

The EntireX Java ACI is able to send and receive data via an HTTP protocol controlled by constructor `com.softwareag.entirex.aci.Broker`. See *How to Enable HTTP Support in a Java Component* under *Writing Advanced Applications - EntireX Java ACI*.

The EntireX Java component `com.softwareag.entirex.aci.TunnelServlet.class` implements a Java servlet for servlet-enabled Web servers. It builds the bridge between Web server and EntireX Broker in the intranet.



The figure above shows how the communication works. In this scenario, a Java client program communicates via HTTP and EntireX Broker with an EntireX server. By using a Broker ID starting with `http://` (passing the URL of the installed HTTP(S) Agent) each Broker request is sent to a Web server, which immediately processes the HTTP(S) Agent, passes the contents to EntireX Broker, receives the response and sends it back via HTTP. For the two partners (client and server) it is transparent that they are communicating through the Web. Java server programs can also communicate via HTTP if necessary.

Configuring the HTTP(S) Agent

To use the HTTP(S) Agent you need a servlet-enabled Web server. See *Prerequisites for EntireX RPC* in the respective section of the Release Notes.

Parameter	Description
broker	The broker you want to address (syntax: as Broker ID in Java).
log	Yes Default. Servlet writes logging information to its standard output.
	No No log is created.

In the following, “tunnel” is used as the agent name.

► To adapt the HTTP(S) Agent

The following steps describe the deployment with the Web archive *entirex.jar* in detail. You can test the HTTP(S) Agent with `http://<host>:<port>/entirex/tunnel`, where *entirex* is the name of the Web application.

- 1 Create the new subfolders in the Web application directory of your Web server, e.g. *tunnel*, *tunnel/WEB-INF*, *tunnel/WEB-INF/lib*.
- 2 Copy the *entirex.jar* into *tunnel/WEB-INF/lib*.
- 3 Create a file named *web.xml* in the folder *tunnel/WEB-INF* with the following content:

```
<web-app>
  <servlet>
    <servlet-name>tunnel</servlet-name>
    <servlet-class>com.softwareag.entirex.aci.TunnelServlet</servlet-class>
    <init-param>
      <param-name>broker</param-name>
      <param-value>yourbroker</param-value>
    </init-param>
    <init-param>
      <param-name>log</param-name>
      <param-value>yes</param-value>
    </init-param>
  </servlet>
  <servlet-mapping>
    <servlet-name>tunnel</servlet-name>
    <url-pattern>/*</url-pattern>
  </servlet-mapping>
</web-app>
```

- 4 Restart your Web server and test the installation by calling the HTTP(S) Agent in your Web browser. The URL is: `http://<yourhost>/tunnel`. If the agent is installed properly, an information page is displayed.
- 5 Run the Java ACI client/server example or the Java RPC example delivered with EntireX and use the agent's URL for client or server or both.

Using Internationalization with the HTTP(S) Agent

Internationalization is transparent for the HTTP(S) Agent. The client sending the EntireX ACI request with HTTP over the Web server through the HTTP(S) Agent fully controls Internationalization. No configuration is necessary for the HTTP(S) Agent.

Activating Tracing for the HTTP(S) Agent

▶ To switch on tracing for the HTTP(S) Agent

- Set the system property `entirex.trace` to one of the values 1, 2, or 3. See *Tracing* under *Writing Advanced Applications - EntireX Java ACI*.

▶ To switch on logging

- Set the configuration parameter `log=yes`.

This logs the parameters from the HTTP header, the HTTP messages and error messages to the logging facility of the Web server.

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Administering the EntireX RPC Server

▪ Locating and Calling the Target Server	252
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The Windows RPC Server, together with the C Wrapper, enables you to call DLLs as servers.

See also *Administering the EntireX RPC Servers using System Management Hub* in the Windows administration documentation.

Locating and Calling the Target Server

The library and program names that come from the client are used to locate the target server. This two-level concept (library and program) has to be mapped in some way to the RPC Server environment. The target servers and their stubs are implemented as Windows DLLs. Windows DLLs also have a two-level concept. The library and program names that come from the client are mapped as follows:

- The library name is used to form the file names of the target server DLL and stub DLL.
- The program name is used to form the entry point names for the target server DLL and stub DLL.

The stub DLL as well as the target server DLL must be accessible through the standard Windows DLL load mechanism.

To locate the target server, the *Possible Values for Libraries* is also used as a kind of search sequence. The default for the library parameter is set `PREFIX(D) - PREFIX()` to be compatible with server stubs and target servers written according to *C Wrapper*.

Under normal circumstances it is not necessary to change the library parameter. There may, nevertheless, be occasion to do so:

- Changing the platform default of the library parameter gives you control and independence over the library name that comes from the client.
- By changing it to a setting of `FIX(DMYLIB) - FIX(MYLIB)` and renaming the server stub and target server built according to *EntireX C Wrapper* to *DMYLIB* and *MYLIB*, you can tailor all or part of the target servers to these libraries regardless of what the client sends.
- Changing the platform default can also make sense when Natural is the client environment, since it always sends *SYSTEM* as the library name.

Example

Assume the following situations:

- A client sends *Example* as the library name and *CALC* as the program name.
- A stub DLL with *DExample.dll* built with the delivered makefile *Server.mak* or a corresponding one exists and can be accessed through the standard Windows DLL load mechanism.
- A target server DLL with the name *Example.dll* built with the delivered makefile *Server.mak* or a corresponding one exists and can be accessed through the standard Windows DLL load mechanism.
- The default value for Windows of `PREFIX(D) - PREFIX()` for the library parameter is not changed.

Search for Stub DLL

The RPC Server under Windows searches for a stub DLL with:

1. An entry point derived from the program name that comes from the client by adding a prefix *D*. For our example the entry point is *DCALC*. This prefix has nothing to do with any library parameter configuration and is always *D*.
2. Names formed by the instructions of the library parameter from left to right. The first library parameter `PREFIX(D)` means: take the library name that comes from the client and add the prefix. For our example above, the DLL name is *DExample.dll*.

If in step 1 such a DLL can be located through the normal DLL load mechanism, it is taken as the stub; otherwise the next DLL name is formed using the next library parameter entry (step 2). If all library parameter entries have been worked off and the stub is not located, an error is returned to the client.

For our example above, the stub *DExample.dll* is found with the first library parameter entry.

Search for Target Server DLL

The RPC Server under Windows searches for the target server DLL with:

1. An entry point using the program name that comes from the client request directly. For our example above, the entry point is *CALC*.
2. Names formed by the instructions of the library parameter from left to right. The first library parameter `PREFIX(D)` means: take the library that comes from the client and add the prefix. For our example above, the DLL name is *DExample.dll*.

If in step 1 such a DLL can be located through the normal Windows DLL load mechanism, it is taken as the target server; otherwise the next DLL name is formed using the next library parameter entry (step 2). If all library parameter entries have been worked off and the target server is not located, an error is returned to the client.

For our example above, the target server *Example.dll* is found with the second library parameter entry.

Setting Server Parameters for the RPC Server

- [Configuration File Syntax](#)
- [Table of Server Parameters](#)
- [Possible Values for Endworkers](#)
- [Possible Values for Libraries](#)

Configuration File Syntax

- Comments must be on a separate line.
- Comment lines can begin with '*', '/' and ';'.
- Empty lines are ignored.
- Headings in square brackets [*topic*] are ignored.
- Keywords are not case-sensitive.

Table of Server Parameters

Configuration File Parameter Syntax (UNIX, Windows, IBM i)	Value	Req. Opt.	Description	Notes
<code>brokerid=localhost</code>	string	R	Broker ID used by the server.	Corresponds to the BROKER-ID field of the Broker ACI control block.
<code>class=RPC</code>	case-sensitive, up to 32 characters	R	Server class used by the server.	Corresponds to the SERVER-CLASS field of the Broker ACI control block.
<code>codepage=</code>		O	This field exposes the Broker ACI field LOCALE-STRING as a parameter to users of the RPC server.	See <i>Using Internationalization under Writing Applications: Client and Server</i> in the EntireX Broker ACI Programming documentation.
<code>compresslevel=0</code>	0-9 or Y N	O	Enforce compression when data is	See <i>Data Compression in EntireX Broker</i> in the

Configuration File Parameter Syntax (UNIX, Windows, IBM i)	Value	Req. Opt.	Description	Notes
			transferred between broker and server.	general administration documentation.
<code>encryptionlevel=0</code>	<code>0 1 2</code>	O	Enforce encryption when data is transferred between client and server.	Corresponds to the ENCRYPTION-LEVEL field of the Broker ACI control block. See also <i>Broker Attributes</i> in the platform-independent administration documentation.
<code>etb_apivers= 0</code>	<code>n</code>	O	Determines the Broker API to use.	Corresponds to the API-VERSION field of the Broker ACI control block. We recommend either not configuring the API Version or setting it to 0. This allows the EntireX Broker and the EntireX RPC server to autodetect the best API version to use. For compatibility with older Brokers, the API version can be set manually.
<code>logon=YES</code>	<code>YES NO</code>	O	YES executes the Broker functions LOGON/LOGOFF. NO does not.	Specify NO for compatibility with EntireX Broker prior to Version 4.1.1.
<code>servername=SRV1</code>	case-sensitive, up to 32 characters	R	Server Name used by the server.	Corresponds to the SERVER-NAME field of the Broker ACI control block.
<code>service=CALLNAT</code>	case-sensitive, up to 32 characters	R	Service used by the server.	Corresponds to the SERVICE field of the Broker ACI control block.
<code>smhport=0</code>	any digit within range 0 to 99999	O	If greater than zero, starts the RPC server with a separate SMH communication task and listen port	

Configuration File Parameter Syntax (UNIX, Windows, IBM i)	Value	Req. Opt.	Description	Notes
			<smhport> to the local TCP/IP system.	
<code>ssl_file=</code>		O	Set the SSL parameters.	See Using SSL or TLS with the RPC Server .
<code>timeout=60</code>	<i>n</i>	O	Timeout in seconds, used by the server to wait for Broker requests.	Corresponds to the WAIT field in the Broker ACI control block. See also Scalability of the RPC Server .
<code>userid=ERX-SRV</code>	case-sensitive, up to 32 characters	R	Used to identify the server to the broker.	Corresponds to the USER-ID field of the Broker ACI control block.
<code>password=</code>	case-sensitive, up to 32 characters	O	Password for Broker logon.	Corresponds to the PASSWORD field of the Broker ACI control block.
<code>endworkers=timeout</code>	See Possible Values for Endworkers	O	Defines the behavior of worker tasks on completion of client requests.	See Scalability of the RPC Server .
<code>minworkers= 1</code>	<i>n</i>	O	Minimum number of parallel worker threads started.	See Scalability of the RPC Server .
<code>maxworkers=10</code>	<i>n</i>	O	Maximum number of parallel worker threads started.	See Scalability of the RPC Server .
<code>tracelevel=None</code>	None Standard Advanced	O	Select the trace level for this server.	See Activating Tracing for the RPC Server .
<code>tracedest=</code>	Default: tracedest=C:\Documents and Settings\ <userid>\My Documents\Software AG\EntireX\ERXTracennn.log, where <i>nnn</i> is from 001 to 005.</userid>	O	The name of the destination file for trace output.	See Activating Tracing for the RPC Server .
<code>library=</code>	library = PREFIX(D) - PREFIX()	O	Specifies criteria to locate target servers and any stubs.	See Possible Values for Libraries and Locating and Calling the Target Server .
<code>restartcycles=15</code>	<i>n</i>	O	Number of restart cycles the RPC Server	This may occur when the RPC Server is

Configuration File Parameter Syntax (UNIX, Windows, IBM i)	Value	Req. Opt.	Description	Notes
			will try to connect to the Broker. A restart cycle will be repeated every <timeout> +60 seconds. When the number of cycles is reached and a connection to the Broker is not possible, the RPC Server stops.	started prior to the Broker or when the Broker is shut down before the RPC Server is shut down.

Possible Values for Endworkers

The server is able to adjust the number of worker threads to the current number of client requests. This is configured with the parameter `endworkers` and several others. See [Scalability of the RPC Server](#) for information on how the various parameters work together and what combinations can be specified.

Value	Explanation
N	Never The number of worker threads is fixed. No additional worker threads are started. <code>minworkers</code> determines the number of workers started.
T	Timeout is used The number of worker threads ranges between the <code>minworkers</code> and <code>maxworkers</code> settings, depending on the number of currently active client requests. Until <code>maxworkers</code> has been reached, the server tries to maintain enough free worker threads to accept all incoming clients. The server stops all worker threads not used in the time specified by the <code>timeout</code> server parameter (see timeout), except for the number of workers specified in <code>minworkers</code> .
I	Immediately The number of worker threads ranges between the <code>minworkers</code> and <code>maxworkers</code> settings, depending on the number of client requests currently active. Until <code>maxworkers</code> has been reached, the server tries to maintain enough free worker threads to accept all incoming clients. The server stops a thread immediately as soon as it has finished its conversation. When the number of active workers falls below the number of workers specified in <code>minworkers</code> , a new thread will be started.

Possible Values for Libraries

The library parameter defines how the RPC Server locates the target server and any stubs on the platform.

The following coding rules apply to the library parameter:

- Up to five library entries can be specified as a sequence.
- Library entries are separated by a hyphen “-”.
- Library entries are used from left to right by the RPC Server.

The meaningful combinations vary per platform and the type of target server:

Operating System	Type of Target Server	Configuration	Description
IBM i	Target servers in ILE COBOL compatible with <i>Mapping IDL Data Types to COBOL Data Types</i> in the COBOL Wrapper documentation or Target servers ILE RPG compatible with <i>Software AG IDL to RPG Mapping</i> under <i>Using EntireX RPC for RPG under IBM i</i> or Target servers ILE CL compatible with <i>Software AG IDL to CL Mapping</i> under <i>Using EntireX RPC for CL under IBM i</i> .	FIX(<i>library</i>) F(<i>library</i>)	The library sent with the client request is ignored. The configured library <i>library</i> is used to locate the target server.
UNIX Windows IBM i	Target servers and their stubs compatible with EntireX C Wrapper.	FIX() or F() FIX(<i>library</i>) or F(<i>library</i>) PREFIX() or P() PREFIX(<i>prefix</i>) or P(<i>prefix</i>)	The library name sent with the client request is ignored. The program name sent with the client request is used to locate the target server. The library sent with the client request is ignored. The configured library <i>library</i> is used to locate the target server and any stubs on the platform. The library name sent with the client request is used to locate the target server and any stubs on the platform. The library name sent with the client request is prefixed with the value in “ <i>prefix</i> ” before locating the target server and any stubs on the platform.

Example: `library = PREFIX(D) - PREFIX()`

The default for the `library` parameter is set to satisfy the environment specifics best. Under normal circumstances it is not necessary to change the `library` parameter.

For an explanation of the approach to locating the target server on your platform, see [Locating and Calling the Target Server](#).

Scalability of the RPC Server

- [Parameters](#)
- [Configuration Examples](#)
- [Suggested Configuration on First Usage](#)

Parameters

The RPC server can be configured to adjust the number of worker threads to the current number of client requests. When more clients are active, more worker threads are needed to achieve the best throughput. Depending on the configuration, worker threads are started on demand and stopped as soon as they are no longer needed.

This mechanism can be configured with the following parameters:

EntireX RPC Server under operating system:	Configuration	endworkers	minworkers	maxworkers	timeout
UNIX Windows IBM i	Fixed number of workers.	Never.	Determines the number of workers started.	Unused.	Not used with this configuration.
UNIX Windows IBM i	Scaling number of workers between <code>minworkers</code> and <code>maxworkers</code> without any idle time.	Immediately.	Determines the minimum number of workers started.	The upper limit of workers started.	Not used with this configuration.
UNIX Windows IBM i	Scaling number of workers between <code>minworkers</code> and <code>maxworkers</code> with configurable idle time.	Timeout.			The idle time for workers can be configured, i.e. a worker is stopped when, for the period defined by <code>timeout</code> , no client request has to be served and the minimum number of

EntireX RPC Server under operating system:	Configuration	endworkers	minworkers	maxworkers	timeout
					workers has not been reached.

Configuration Examples

- [Configuration 1: Medium Lifespan of Worker Threads](#)
- [Configuration 2: Shortest Lifespan of Worker Threads](#)
- [Configuration 3: Fixed Number of Workers](#)

Configuration 1: Medium Lifespan of Worker Threads

- `endworkers=T (timeout)`
- `timeout=600`
- `minworkers=1`
- `maxworkers=10`

The `endworkers` parameter determines the condition under which a worker will be stopped. The value is the period of time specified by the parameter `timeout` (600 seconds, i.e. 10 minutes). Active workers will be stopped if no client requests arrive within the timeout period, except for the number of threads specified in `minworkers`.

`Minworkers` specifies the minimum number of workers that must be available to handle incoming client requests. The server is started (manually) and the first worker (`minworkers=1`) waits for client requests. When the first client request arrives, a second worker is started. This ensures that there will be at least one free worker (`minworkers=1`) to handle the next incoming client request.

When the first client request has been worked off (in conversational mode when the conversation has been ended, and in non-conversational mode when the request has been answered), there will be two workers active. For the next incoming client request (second request) no additional worker will be started because the second worker is still free. A third worker will only be started if a third client request arrives before the second request has been finished, in which case there will be three active workers, and so on.

The `maxworkers` parameter specifies the maximum number of active worker tasks permitted (default is 10).

Configuration 2: Shortest Lifespan of Worker Threads

- `endworkers=I` (immediately)
- `timeout=600`
- `minworkers=1`
- `maxworkers=10`

In this example the `endworkers` parameter has been set to "I" (immediately). This setting will stop worker threads immediately when client requests are completed, except for the number of threads specified in `minworkers`. All other behavior is the same as for [Configuration 1: Medium Lifespan of Worker Threads](#).

Configuration 3: Fixed Number of Workers

- `endworkers=N` (never)
- `timeout=600`
- `minworkers=10`
- `maxworkers=`

This configuration determines a fixed number of workers. The `maxworkers` parameter is ignored and the `endworkers` parameter is set to "N" (never). All worker threads are started immediately with the server and will never stop. This method is useful in minimizing system resources.

Suggested Configuration on First Usage

When you first start using Micro Focus RPC Server, we suggest the following settings for scaling the server:

- `endworkers=T` (timeout)
- the `timeout` parameter can be set, for example, to 2 minutes (`timeout=120`).
- low value for `minworkers` is suggested (e.g. `minworkers=2`)
- the `maxworkers` setting depends on the expected maximum number of clients active in parallel (e.g. `maxworkers=10`)

Using Internationalization with the RPC Server

It is assumed that you have read the document *Internationalization with EntireX* and are familiar with the various internationalization approaches described there.

The RPC Server running under Windows

- does not, by default, send a codepage as part of the locale string to the broker
- assumes that the broker's locale string defaults match; see *Broker's Locale String Defaults* under *Locale String Mapping* in the internationalization documentation. If they do not match, provide the codepage explicitly.

When setting the codepage manually with the parameter `codepage`, the following rules apply:

- You can provide a codepage in the locale string sent to the broker. If a codepage is provided, it must follow the rules described under *Locale String Mapping* in the internationalization documentation.
- The RPC server itself does not convert your application data (contained in RPC IDL type A, K, AV and KV fields) received from the broker before giving them to your server application. Under normal circumstances, it is not possible to configure a codepage other than the codepage used in your environment for file and terminal IO. If this is not adhered to, unpredictable results may occur.
- The codepage used must also be a codepage supported by the broker, depending on the internationalization approach.
- Before starting the RPC Server, set the locale string with the parameter `codepage`.

Example:

```
codepage=LOCAL
```

Using SSL or TLS with the RPC Server

There are two ways of specifying SSL or TLS, depending on the complexity of the parameters:

- as part of the Broker ID for short parameters, the simplest way
- using the SSL file, a text file containing more complex parameters.

For more information, see *SSL or TLS and Certificates with EntireX*.

Specifying the SSL or TLS Parameters as Part of the Broker ID

The simplest way to specify SSL or TLS parameters is to add them to the Broker ID.

Example:

```
ssl://ETB001?TRUSTSTORE=whatever
```

Specifying the SSL or TLS Parameters in a Separate File

For complex SSL or TLS parameters there is the SSL file, a text file containing the parameters.

The `SSL_FILE` keyword points to this text file.

▶ To specify the SSL or TLS parameters in the SSL file

- 1 Set the parameters as described under *Running Broker with SSL or TLS Transport* in the platform-specific administration documentation.
- 2 Prefix/suffix the Broker ID with the SSL key.

Example:

```
brokerid=SSL://ETB001  
.  
.  
ssl_file=C:\mySSLdirectory\mySSLParms.txt
```

Starting the RPC Server

Before starting the EntireX RPC server, ensure that all dynamically loaded objects (server stubs and server) can be accessed using the search path.

▶ To start the EntireX RPC server manually

- Use the format

```
RPCserver CFG=<name> [-option] [Brokerid] [Class] [ServerName] [Service]
```

where *<name>* determines the configuration file in use.

Options:

- **-smhport** number
Sets the RPC server parameter smhport to number. Typically used by SMH Facility.
- **-serverlog** *<file>*
Defines an alternative log file for Window services. Typically used by Windows Services. See [Running an EntireX RPC Server as a Windows Service](#).
- **-s[ilent]**: Run server in silent mode, that is: no terminal input will be required (e.g. acknowledge error messages). The job will terminate automatically. Recommended for background jobs.
- **-TraceDestination** *<file>*
Set the trace destination parameter.
- **-TraceLevel** None.Standard.Advanced. Set the trace level parameter.



Note: The server input arguments will be resolved from left to right. Thus parameters that can be applied on the command line as well in the configuration file may be overridden.

▶ To start the EntireX RPC server using Windows services

- See [Running an EntireX RPC Server as a Windows Service](#).



Note: For reasons of compatibility with versions before 5.1.1, the old command to start the server

```
RPCserver <Brokerid> <Class> <ServerName> <Service>
```

will continue to be supported. However, a server started with this call will use the default parameters. Parameters other than Broker ID, Class, ServerName, Service require the CFG= form of the server start command.

▶ To start the EntireX RPC server using System Management Hub

- 1 See *Administering the EntireX RPC Servers using System Management Hub* in the UNIX and Windows administration documentation for information on adding an EntireX RPC server to the System Management Hub.
- 2 The System Management Hub facility “Adding a Local RPC Server” will use the batch script *startcserver.bat* of the EntireX Installation to apply the server parameters. Change the batch

script according to your system installation or add parameters to the System Management Hub “Start Command” input property.

Stopping the RPC Server

▶ To stop the EntireX RPC Server

- Use the function `Deregister a Service` or `Deregister a Server` of the System Management Hub. This method ensures that the deregistration from the Broker is correct.

See also *EntireX RPC Server Return Codes* under *Error Messages and Codes*.

Activating Tracing for the RPC Server

▶ To switch on tracing for the RPC Server

- Set the parameters `tracelevel` and `tracedestination`, see [Table of Server Parameters](#).

To evaluate the return codes, see *Error Messages and Codes*.

See also [Tracing the RPC Server](#).

21 Administering the EntireX RPC Servers using System

Management Hub

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The System Management Hub RPC server agent provides a user-friendly interface for managing and monitoring the EntireX RPC servers.

The System Management Hub is Software AG's cross-product and cross-platform product management framework. This section assumes that you are familiar with the System Management Hub software. The basic concepts of this product, its installation and the System Management Hub features common to all Software AG products are described in the separate System Management Hub documentation.

Introduction

The RPC server agent distinguishes between two kinds of RPC server, based on their locations:

Local

A local RPC server needs to run on a machine where the SMH is installed. In addition to starting and stopping RPC servers, the RPC agent provides support for editing the configuration file and monitoring the server data.

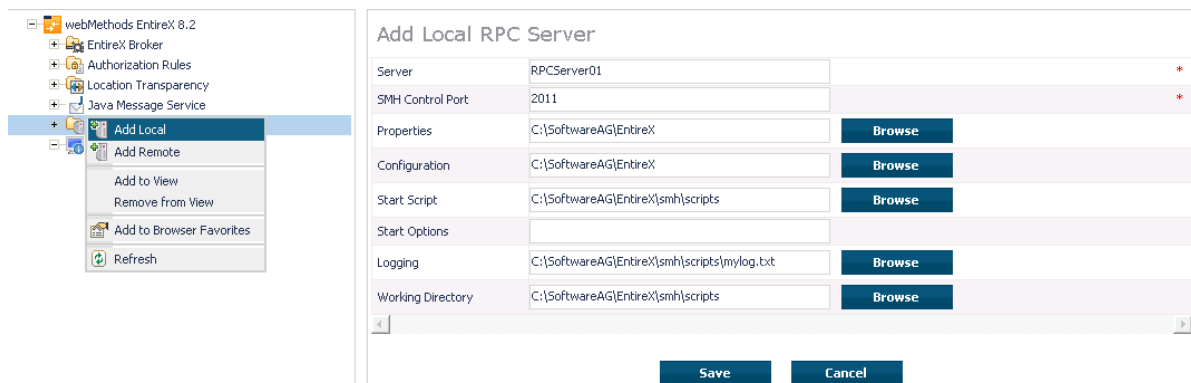
Remote

Remote RPC server functionality is only available for RPC server platforms where the SMH is not available, such as z/OS and IBM i. For remote RPC servers the System Management Hub RPC server agent provides monitoring functionality only. Starting and stopping RPC servers and editing an RPC server's configuration file are not supported.

Adding a Local RPC Server

To add a local RPC server

- 1 Select the root node of the RPC server tree in the tree-view frame.
- 2 From the context menu, choose **Add Local**. The following dialog window will be displayed.



Server

This name will be displayed in the RPC server tree.

SMH Control Port

Set an SMH Control Port for the RPC server configuration port. This TCP/IP port must be unused on your machine and unique to the RPC server settings. This port is required for intercommunication between the RPC server and the RPC server agent. The C RPC Server as well as the Java RPC-based server has a corresponding parameter in the configuration/property file. The SMH Control Port option in the Add Local RPC Server dialog will be used as command-line parameter while starting the RPC Server.

Since the command-line parameters have higher priority, the configuration/property file settings will be ignored if command-line parameters are used. See *Customizing the Java RPC Server* in the UNIX and Windows administration documentation and *Setting Server Parameters for the RPC Server* in the UNIX and Windows administration documentation.

Properties, Configuration

Enter the full path name of your RPC server's configuration file and/or property file. The System Management Hub agent requires this file name to open it in the editor. See also [Command Functions for Local RPC Servers](#) under [Operating and Monitoring the RPC Servers using System Management Hub](#). For example: the EntireX XML/SOAP RPC Server requires a configuration file as well as a property file. It is useful to enter both names to edit and view these files. The edit command buttons will only be available if the corresponding field is filled. See *EntireX\config* directory for some examples of configuration and property files.



Note: Use an absolute path for the file name. See also [Working Directory](#).

Start Script

The start script will be called when the RPC server is started.

The SMH RPC server agent uses the execute script in the Start Script line to start the RPC server. Only a batch or command script file under Windows and a shell script file under UNIX to start the RPC server, where other settings will be made, such as the CLASSPATH setting for the Java server or Configuration file settings for the C RPC Server, are allowed. Some example files are provided in the directory `<EntireX installation Directory>\SMH\scripts`.

The SMH RPC server agent only allows files with the file extensions in the table below to start scripts. Other file extensions will cause a starting error. If the file extension is changed, the RPC server agent does not check the contents of the file to determine whether the file format matches the file extension.

Operating System	File Extension
Windows	.bat .cmd
UNIX	.sh .csh .bsh .ksh

The start script option may only contain the name of the batch or shell script for starting the RPC Server. If additional parameters are required, use the Start Option line to submit these to the start script.

This start script line will be extended with the parameter `-smhport port number` (from the SMH Control Port option) as the first parameter when starting the RPC server.



Note: Use an absolute path for the file name. See also [Working Directory](#).

Start Options

The start options will be connected to the start script as a start parameter.

For example: use the start option `cfg=path\server.cfg` to start the rpcserver with a configuration file. The entries on the Configuration and Property files will not be used automatically as start parameters.

For the corresponding start parameters of the RPC Server, see *Customizing the Java RPC Server* in the UNIX and Windows administration documentation and *Setting Server Parameters for the RPC Server* in the UNIX and Windows administration documentation.



Note: If the `path` includes blank spaces, the entire option must be enclosed in quotation marks. All path names used must be absolute path names. The RPC server agent does not try to resolve relative path names.

Logging

If the Logging option has been entered, the Start script line will be extended with a pipe to redirect the standard out and standard error to these files. These log files can be viewed with the SMH's built-in viewer.

Working Directory

The working directory will be set by the RPC Agent when the start script is called. Relative filenames in the option Properties, Configuration, Start script and Logging will be extended with the working directory while saving. If the working directory line is empty, the path of the SMH service (Windows) / daemons (UNIX) will be used as default.

Save

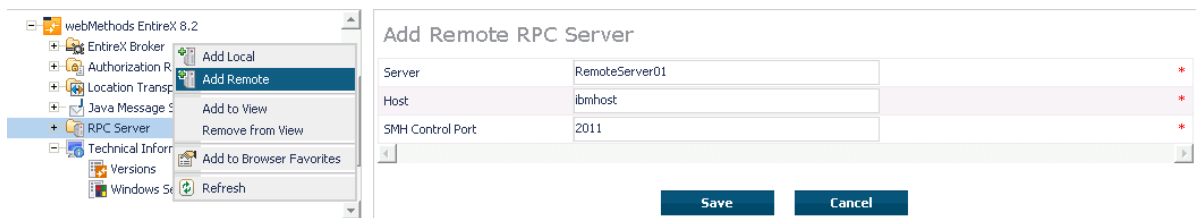
After confirming the settings for the new RPC Server Item with Save, the server is ready for use with the System Management Hub.

Adding a Remote RPC Server

Remotely configured servers can only run on platforms where SMH is not available. Therefore the RPC server needs to be started and stopped by the owner of the RPC server. The RPC server does not have the monitoring functionality enabled automatically. It must be started with the start parameter `-smhport unique tcp/ip port` to enable the monitoring functionality.

▶ To add a remote RPC server

- 1 Select the root node of the RPC server tree in the tree-view frame.
- 2 From the context menu, choose **Add Remote**. The following dialog window will be displayed.



Server

This name will be displayed in the RPC server tree.

Host

This is the network name or the IP address of the host system where RPC server runs.

SMH Control Port

System Management Hub Control port on which the RPC server listens. The owner of the server must configure the RPC server on this TCP/IP port. Please see the corresponding RPC server documentation. See also *Customizing the Java RPC Server* in the UNIX and Windows administration documentation and *Setting Server Parameters for the RPC Server* in the UNIX and Windows administration documentation.



Note: The hostname and TCP/IP port will not be checked for validation. The user is responsible for the input in these fields. If the same hostname and port are used for server entries twice or more, the same status will be displayed for each server.

Operating and Monitoring the RPC Servers using System Management Hub

The System Management Hub RPC server agent distinguishes between local and remote RPC servers. The functionality changes depending on the location. For local RPC servers, the System Management Hub GUI environment provides full control. For remote RPC servers, only monitoring functionality is provided.

This section covers the following topics:

- [Select Root Node of the RPC Server](#)
- [Select an RPC Server](#)
- [Command Functions for Local RPC Servers](#)
- [Command Functions for Remote RPC Servers](#)
- [Tracing Hints](#)
- [Batch Interface](#)

Select Root Node of the RPC Server

Once the root node of the RPC server has been selected, the RPC server agent retrieves the following information and displays it in a table. This information is available for both locally and remotely monitored RPC servers regardless of the RPC server type. See *SNMP Support for EntireX* in the System Management Hub documentation and *SNMP Interface* in the separate System Management Hub documentation.

Property	Description	Note
Server	Name of the Server. This is the name of the server in the SMH interface which was entered when the RPC Server was added.	
Status	Status of the server. Running, Down, Retry.	1,2
Started	Start-time of the server.	
Worker	Current number of worker threads.	
High	Worker threads high watermark.	
Name	Host name / JES job name.	3
Address	Network address.	4

Notes:

1. The status may be "Init" and "Shutdown" for the XML Servers. The status "Down" will be generated in the System Management Hub RPC server agent if communication with the RPC server is not available.

2. Status

Status	Description
Running	The server is running normally.
Down	The server is not running or the RPC server was started without the System Management Hub control port option. The System Management Hub RPC server agent cannot connect to the RPC Server.
Retry	The RPC Server has no connection to the Broker and is trying to connect or reconnect.
Init	The RPC server is just starting and is not yet ready on the RPC interface.
Shutdown	The RPC server is just shutting down and will be down in a moment.
Error	Any error that could not be recovered and leads to shutdown of the server, for example: 0021 0043: ATTR: Service definition not found.

3. This display depends on the RPC Server and the platform where the server is running. On UNIX and Windows (local servers) only the Hostname will be displayed. Under IBM i, the RPC Server will also display the JES job name if available.
4. This display shows the IP or Net-Work address of the RPC Server where the server is running.

Select an RPC Server

Each RPC server has a common, scalable part and a server-specific part. Therefore the property information may differ for each server type.

For local servers, the top of the display in the right-hand panel is generated by the System Management Hub RPC server agent and represents the input made when the RPC server was added. For remote RPC servers, the first three lines are generated by the System Management Hub RPC server agent and also represent the input made when the RPC server was added.

The subsequent empty line separates the information generated by System Management Hub RPC server agent from the retrieved information.

See also *EntireX RPC Servers*.

Each RPC server may also have subtables which depend on the RPC Server type and the platform where the RPC server is running. If the RPC servers have subtables, the RPC server node is expandable and shows a “+” (plus sign) in front of the node name.

Command Functions for Local RPC Servers

Once a local RPC server has been selected in the SMH tree view, the following RPC Server control commands will be available:

Function	Description
Modify	Opens a dialog window to modify the selected RPC server settings which were made when the local RPC server was added to the SMH environment. (See note below.)
Delete	Removes the name of the selected RPC server from the RPC server tree. No files will be removed with this action. (See note below.)
Start	Starts the selected RPC server. This function calls the entry from the Start script input line. (See note below.)
Stop	Sends a terminate command to the selected RPC server. (See note below.)
Edit Properties	Opens the properties file of the selected RPC server which was entered in the Property File line. (See note below.)
Edit Configuration	Opens the configuration file of the selected RPC server which was entered in the Configuration File line. (See note below.)
Edit Start Procedure	Opens the file which was entered in the Start script line for the selected RPC server, if this file was an editable file. (See note below.)
Tracelevel	Opens a dialog window to select the trace level and sends a change trace level command with the selected trace level to the RPC server.



Note: The System Management Hub employs the multi-user concept. If more than one user modifies, deletes or edits the same RPC Server Item at the same time, the data of the user who saves last will overwrite the modifications of any previous user(s). Start and Stop

commands may also be used by multiple users. We recommend using the Refresh command to update the status of the RPC Server before starting or stopping it.

Command Functions for Remote RPC Servers

Once a remote RPC server has been selected in the SMH tree view, the following RPC Server control commands are available:

Function	Description
Modify	Opens a dialog window to modify the selected RPC server settings which were made when the remote RPC server was added to the SMH environment. (See note below.)
Delete	Removes the name of the selected RPC server from the RPC server tree. No files will be removed with this action. (See note below.)
Tracelevel	Opens a dialog window to select the trace level and sends a change trace level command with the selected trace level to the RPC server.

The commands `Start` and `Stop` for the RPC server are not available for remotely managed RPC servers. The System Management Hub RPC server agent provides only monitoring functionality for this kind of server; it does not provide the Edit and View Configuration functions or the Start Batch Files function.



Note: The System Management Hub employs the multi-user concept. If more than one user modifies, deletes or edits the same RPC Server Item at the same time, the data of the user who saves last will overwrite the modifications of any previous user(s).

Tracing Hints

UNIX

The trace will work under UNIX as usual.

Windows

If the C RPC Server under Windows was used, the trace destination may change. If the TraceDestination option was not defined in the configuration file, the C RPC Server under Windows will write its trace file for the user SAGUSER. The System Management Hub will start the RPC Servers on behalf of the user SAGUSER.

For more information on the tracing location, see table entry Trace File/Location on the corresponding RPC server. The table entry will only be available if the RPC server is running.

See also *Activating Tracing for the RPC Server* in the respective sections of the documentation.

Batch Interface

The RPC server agent supports the System Management Hub's batch interface. The table below contains the corresponding batch commands.

Task	Batch Command	Note
List all defined RPC servers on the managed host.	show rpcserverlist	
Show detailed information on the <rpc server>	show rpcserver name=<rpc server name>	
Start the <rpc server>	start rpcserver name=<rpc server name>	1
Stop the <rpc server>	stop rpcserver name=<rpc server name>	1



Note:

⁽¹⁾ Only local RPC server can be started or stopped with this command. Attempts to start and stop remote RPC servers will fail.

Example:

Assume that your RPC Server is defined with the node name "RPC Server1" in your SMH environment. Enter the `argbatch` command with the following parameters to execute the batch command.

```
argbatch show rpcserver user=[userid] password=[passwd] target=[managed host name]
"product=webMethods EntireX 8.1" "name=RPC Server1"
```



Note: `argbatch` is part of the System Management Hub software. It is located in the *bin* directory of the System Management Hub installation.

See *The System Management Hub Batch Interface* in the *System Management Hub for EntireX* documentation.

22

Running an EntireX RPC Server as a Windows Service

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Introduction

Any EntireX RPC server can be run as a Windows service. This has the following advantages:

- The server is started automatically when the PC is booted and shut down automatically when the PC is shut down.
- The service can be run under a system account that has different rights on a PC than the user account.
- The service can be run under any valid user ID.
- The Control Panel provides an overview of started servers and their status.

To run an RPC server as a Windows service, a batch script (.bat) that can start the RPC server is required. Sample batch scripts are provided in the EntireX *bin* folder:

- microfocusservice.bat
- cserver.bat
- cicseciservice.bat
- imsconnectservice.bat
- dotNetServer.bat
- jrpservice.bat
- xmlrpcservice.bat
- ...

To install RPC server as windows services, use the EntireX RPC Service Tool. Multiple services can be installed if more than one RPC server is required.

Sample Installation



Note: The steps below use the C RPC Server as an example, but the information applies to all RPC servers.

▶ To install an RPC Server as a Windows Service

- 1 Enter the EntireX installation directory and copy file *EntireX\bin\RPCService.bat*. Save the file under a different name, for example *EntireX\bin\RPCService_C.bat*.

The EntireX installation directory is specified during installation. Later on when registering the service, the argument value of parameter `-ext` of `rpcservice.exe` must correspond with this extension, for example `-ext C`.

The extension `_C` will later correspond with the argument in parameter `-ext` when registering the service using `rpcservice.exe`. Also the name of the service will be extended by this value. This is needed to distinguish multiple server instances.

- 2 Modify batch file `RPCService_C.bat` and uncomment the line where the C RPC server batch file is referenced.

```
cserver.bat %*
```

The file contains entries for all the different types of RPC servers. The C RPC server is already uncommented, it is the default.

- 3 Adapt the corresponding configuration file, for example `\EntireX\config\cserver.cfg`, to your needs.
- 4 Optionally test whether the server is configured correctly before registering it as a Windows service by entering the following from a command prompt:

```
RPCService_C.bat
```

- 5 Register the Server as a Windows service. Enter:

```
rpcservice.exe -install -ext C -serverlog c:\serverlog.txt -trace  
c:\servertrace.txt -script c:\SoftwareAG\EntireX\bin\RPCservice_C.bat
```

where `c:\SoftwareAG` is the installation directory,

<code>-ext</code>	must correspond with the extension specified in step 1
<code>-serverlog</code>	is optional
<code>-trace</code>	is optional
<code>-script</code>	must point to file <code>RPCservice_C.bat</code> created in step 1



Note: For the C RPC server under Windows, make sure the server script is run using the option `-silent`. See [Starting the RPC Server](#).

EntireX RPC Service Tool

The EntireX RPC Service Tool is provided to install, remove, start and stop RPC services. An overview screen “Software AG EntireX RPC Service” lists the available arguments and options.

Displaying the available Arguments and Options

▶ **To display the overview screen**

- In the command line, go to the EntireX *bin* directory and enter:

```
rpcservice.exe -help
```

The following screen is displayed:

```
Software AG EntireX RPC Service (V.n.n.n)
Service Tool to start/stop RPC servers
(c) Copyright Software AG 1997-20nn. All rights reserved.
-----

Usage:
rpcservice -install      [options]    to install the service
rpcservice -remove      [options]    to remove the service
rpcservice -help        [options]    prints this panel

Options:
  [-ext[ension]         <extension>]    use a service extension
  [-script              <path\script>]    set the server startup file
                                          for this service
  [-serverlog          <path\logfile>]    set the communication file
                                          between server and service
  [-userid             <userid>]         set userid for broker logon
  [-password           <password>]       set password for broker logon
  [-trace              [<tracefile>]]    used for diagnostics
```


Explanation of Options

■ No option

This will install a service displayed as “Software AG EntireX RPC Service”. The service is registered as EXXRPCService (Service name under Properties). Required suboptions will be set to their defaults.

■ **-extension** <ext>

use this option to add an extension to the service to differentiate it from other instances, if you want to install multiple RPC service instances. The service will be displayed as “Software AG EntireX RPC Service [<ext>]”. The default log file *RPCservice_<ext>.log*. will be added.

 **Important:** If you use this option, the program will by default search for a script with the same extension, *RPCService_<ext>.bat*. Make sure it exists.

Example:

- For a Java RPC Server (see also *Running the Java RPC Server as a Windows Service* under *Administering the EntireX Java RPC Server* in the Windows administration documentation in the Windows administration documentation), you can use

```
-install -ext java -script <EntireX bin directory>\jrpcserver.bat
```

The service will be displayed as Software AG EntireX RPC Service [java], the log file will be called *RPCservice_java.log*.

- For a Micro Focus RPC Server you can use:

```
-install -ext MicroFocus -script <EntireX bin directory>\microfocusserver.bat
```

The service will be displayed as Software AG EntireX RPC Service [MicroFocus], the log file will be called *RPCservice_MicroFocus.log*.

- For a C RPC Server you can use:


```
-install -ext C -script cserver.bat
```

The service will be displayed as Software AG EntireX RPC Service [C], the log file will be called *RPCservice_C.log*.

Default: none.

■ **-script**

use this option to specify a batch script other than the default scripts *RPCService.bat* or *RPCService_<ext>.bat*.

 **Important:** The script file must pass external parameters to the RPC server. Please make sure that %* remains at the end of the line that contains the RPC server call, so that parameters coming from the Windows Service are passed to the RPC server:

```
rpcserver.exe "cfg=..\config\cserver.cfg"%*
```

Default: <EntireX-installation>\bin\RPCService.bat
or, if -ext <ext> is applied:
<EntireX-installation>\bin\RPCService_<ext>.bat

■ **-serverlog**

We recommend that you do not change the name of this file.

Default: CSIDL_LOCAL_APPDATA\Software AG\EntireX\RPCservice.log
or, if -ext <ext> is applied:
CSIDL_LOCAL_APPDATA\Software AG\EntireX\RPCservice_<ext>.log

CSIDL_LOCAL_APPDATA is resolved at runtime according Microsoft's policy for user and application repositories. See [Windows-specific Folders](#).

■ **-userid and -password**

use these options if your target Broker requires EntireX Security.

These options are obsolete from EntireX versions 8.2 SP1. RPC servers communicate their user ID/password credentials via the server log file if required by EntireX Security. See [Running with EntireX Security](#). The options are still supported for compatibility with earlier versions or if the user ID and password of the RPC service have to be different from those of the RPC server(s). If the user ID and password are applied in this RPC service (and are different from the default), these values take precedence over the credentials that may be supplied by the RPC server(s).

Defaults:

User ID: ERX-USER

Password: PASSWORD



Note: This service requires the broker.dll. Make sure that when the service is executing under the control of the Windows Service Manager it can access the broker.dll in the standard path definitions or in the EntireX installation directory.

Customizing the Service

You can set the service to start the RPC server automatically or manually.

▶ **To customize the service**

- 1 Go to **Control Panel > Administrative Tools > Services** and select the service and then **Properties**.
- 2 Set the Startup type as desired or
- 3 Start/stop the service as desired.

Removing the Service

▶ To remove the service

- In the command line, go to the EntireX *bin* folder and enter:

```
rpcservice.exe -remove [-ext[ension] <extension>]
```

Tracing for the Windows Service

Use the `-trace` option with the individual commands.

- with `-install`

The trace option will be stored in the System Registry and tracing will be enabled if the service is started/stopped by the Service Manager. It can only be switched off by removing the service.

- With the other commands trace runs as long as the command takes to finish its task.
- You can specify a target log file. By default the file is written to the Windows folder for user documents. See [Folder for User Documents](#).

Starting an RPC Server Using the Service

If the startup type for the service is set to automatic, the server will be started when the PC is booted.

▶ To start the server manually

- Go to **Control Panel > Administrative Tools > Services** and select the service, then **Properties** and choose **Start**.

Stopping an RPC Server Using the Service

If you selected startup type automatic in the service properties, the server will be stopped by the operating system when the PC is shut down.

▶ To stop the server manually

- Use the service, go to **Control Panel > Administrative Tools > Services** and select the service, then **Properties** and choose the **Stop** button.

If you choose to stop the server using the EntireX utilities, the Windows service will change the status from “running” to “stopped” and writes a warning message in the event log that the EntireX server has stopped for an unknown reason.

Running with EntireX Security

Starting an RPC Server running under EntireX Security

To start an RPC server, supply a valid user ID and password to log on to the broker. The ID and password are applied to the configuration of the individual RPC server(s).

Stopping an RPC Server running under EntireX Security;

When you stop an RPC server, the RPC service uses the user ID/password from the credentials provided by the new RPC server(s), if applied. Otherwise user ID and password may be taken from the RPC service installation options (see above).



Note: Broker command service `etbcmd` is used to stop the broker. See *Broker Command and Information Services*. This means that users who can start RPC servers to certain broker services also need access rights to `Class=SAG, Server=ETBCIS, Service=*`.

Windows-specific Folders

Folder for Application Data

The file system directory that serves as a common repository for application-specific data.

A typical path is *C:\Documents and Settings\username\Application Data*.

Under Windows 7, this path for the SYSTEM user might resolve to:
"C:\Windows\System32\config\systemprofile\AppData\Local".

Folder for Local (Non-roaming) Application Data

The file system directory that serves as a data repository for local (non-roaming) applications.

A typical path is *C:\Documents and Settings\username\Local Settings\Application Data*.

Folder for User Documents

The file system directory used to physically store a user's common repository of documents.

A typical path is *C:\Documents and Settings\username\My Documents*.

See [MSDN Library](#).

23

Administration of the EntireX Java RPC Server

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The EntireX Java RPC Server is an RPC server which runs Java server interface objects generated from your IDL files. This server can register an Attach Service to start several services with the same server address on demand.

Each of these services can process one call at a time. The Java RPC Server is started by a script, which you may customize. Parameters for the server are configured in a Java properties file. On Windows platforms, this RPC Server can run as a Windows service.

Customizing the Java RPC Server

- [Introduction](#)
- [The Properties File](#)
- [Example](#)
- [Properties and Command-line Options](#)

Introduction

The script files that start the Java RPC Server allow command-line options as described in the table below. Alternatively, you can use System properties or a property file. The command-line option has the highest priority; the System property has second priority, and the entries of a property file have third priority.

The Java RPC Server can adjust the number of worker threads to the number of parallel requests. Use the properties `entirex.server.fixedservers`, `entirex.server.maxservers` and `entirex.server.minservers` to configure this scalability. If `entirex.server.fixedservers=yes`, the number of servers specified in `entirex.server.minservers` is started and the server can process this number of parallel requests. If `entirex.server.fixedservers=no`, the number of worker threads balances between what is specified in `entirex.server.minservers` and what is specified in `entirex.server.maxservers`. This is done by a so-called attach server thread. At startup, the number of worker threads is the number specified in `entirex.server.minservers`. A new worker thread starts if the Broker has more requests than there are worker threads waiting. If more than the number specified in `entirex.server.minservers` are waiting for requests, a worker thread stops if its receive call times out. The timeout period is configured with `entirex.server.waitserver`.

The Properties File

The default name of the properties file is `entirex.server.properties`. It can be changed by assigning an arbitrary file name with a path to a Java system property with the name `entirex.server.properties`. The file is searched for in the directory of the start script.

An example for the properties file is in subfolder `config` of the installation folder.

Example

Under Windows:

```
java -Dentirex.server.properties=rpcserver.properties -classpath <entirex.jar with ↵
path>;<path to your server
stubs> com.softwareag.entirex.aci.RPCServer
```

Properties and Command-line Options

Name	Command-line Option	Default Value	Explanation														
entirex.rpcserver. packagename.entirex. rpcserver. packagename. <libraryname>=packagename <libraryname>= packagename			See Using Package Names with the Java RPC Server .														
entirex.server.brokerid	-broker	localhost	Broker ID														
entirex.server. codepage	-codepage		The codepage the server uses. Permitted values are the name of the codepages the JVM supports. See Customizing the Java RPC Server for details.														
entirex.server. compresslevel	-compresslevel	0 (no compression)	Permitted values (you can enter the text or the numeric value): <table border="1"> <tbody> <tr> <td>BEST_COMPRESSION</td> <td>9</td> </tr> <tr> <td>BEST_SPEED</td> <td>1</td> </tr> <tr> <td>DEFAULT_COMPRESSION</td> <td>-1, mapped to 6</td> </tr> <tr> <td>DEFLATED</td> <td>8</td> </tr> <tr> <td>NO_COMPRESSION</td> <td>0</td> </tr> <tr> <td>N</td> <td>0</td> </tr> <tr> <td>Y</td> <td>8</td> </tr> </tbody> </table>	BEST_COMPRESSION	9	BEST_SPEED	1	DEFAULT_COMPRESSION	-1, mapped to 6	DEFLATED	8	NO_COMPRESSION	0	N	0	Y	8
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BEST_SPEED	1																
DEFAULT_COMPRESSION	-1, mapped to 6																
DEFLATED	8																
NO_COMPRESSION	0																
N	0																
Y	8																

Name	Command-line Option	Default Value	Explanation
entirex.server. customclass	-customclass		This class is used for custom initialization and shutdown of the server. In addition, this class allows handling when closing a conversation and handling the termination of a worker thread. See <code>ServerImplementation</code> in the Javadoc documentation of the Java ACI for more information.
entirex.server. encryptionlevel	-encryption	0	Encryption level (if Broker is version 6.1.1 or higher. Valid values: 0,1,2).
entirex.server. environment			Can be used in a user-written translation exit of the Broker. See <code>BrokerService</code> , <code>setEnvironment(java.lang.String)</code> (EntireX Java ACI) in the Javadoc documentation of the Java ACI.
entirex.server. fixedservers		no	If no, use attach server to manage worker threads, otherwise run minimum number of server threads.
entirex.server. logfile	-logfile		Path and name of the trace output file. Environment variables in the name are resolved only if used as command-line option.
entirex.server. maxservers		32	Maximum number of worker threads.
entirex.server. minservers		1	Minimum number of server threads.
entirex.server. monitorport	-smhport	0	The port where the server listens for commands from the System Management Hub (SMH). If this port is 0, no port is used and management by the SMH is disabled.
entirex.server. name			The name of the server.
entirex.server. password	-password		The password for secured access to the Broker. For Java 1.4 and above, the password is encrypted and written to the property <code>entirex.server.password.e</code> . To change the password, set the new password in the properties file (default is <code>entirex.server.properties</code>). To disable password encryption, set <code>entirex.server.passwordencrypt=no</code> . Default for this property is yes. Password encryption is not available for Java 1.3 and below.

Name	Command-line Option	Default Value	Explanation
entirex.server.properties	-propertyfile	entirex.server.properties	The file name of the property file.
entirex.server.restartcycles	-restartcycles	15	Number of restart attempts if the Broker is not available. This can be used to keep the Java RPC Server running while the Broker is down for a short time.
entirex.server.security	-security	no	no/yes/auto/Name of BrokerSecurity object.
entirex.server.serveraddress	-server	RPC/SRV1 /CALLNAT	Server address
entirex.server.serverlog	-serverlog		Name of the file where start and stop of worker threads is logged. Used by the Windows RPC Service.
entirex.server.userid	-user	JavaServer	The user ID for the Broker for RPC. See entirex.server.password .
entirex.server.verbose	-verbose	no	Verbose output to standard output yes/no.
entirex.server.waitattach		600S	Wait timeout for the attach server thread.
entirex.server.waitserver		300S	Wait timeout for the worker threads.
entirex.timeout		20	TCP/IP transport timeout. See <i>Setting the Transport Timeout</i> under <i>Writing Advanced Applications - EntireX Java ACI</i> .
entirex.trace	-trace	0	Trace level (1,2,3).

Using Package Names with the Java RPC Server

A package name can be specified when the server is generated.

The Java RPC Server can handle server programs with package names if the package name of each library is configured in the properties of the server. For each library the property `entirex.rpcsver.packagename.<library>` has the value of the package.

Example for the library Example (as in *example.idl*):

```
entirex.rpcsver.packagename.example=my.package
```

The library name must be lowercase.

Using Internationalization with Java RPC Server

It is assumed that you have read the document *Internationalization with EntireX* and are familiar with the various internationalization approaches described there.

With the parameter `codepage` for the Java RPC Server you can

- override the encoding used for the payload sent to / received from the broker. Instead of using the default encoding of the JVM, the given encoding is used. Using this method does not change the default encoding of your JVM.
- force a locale string to be sent if communicating with broker version 7.1.x and below. You can use the abstract codepage name `LOCAL` to send the default encoding of the JVM to the broker. See *Using the Abstract Codepage Name LOCAL* under *Locale String Mapping* in the internationalization documentation.

EntireX Java components use the codepage configured for the Java virtual machine (JVM) to convert the Unicode (UTF-16) representation within Java to the multibyte or single-byte encoding sent to or received from the broker by default. This codepage is also transferred as part of the locale string to tell the broker the encoding of the data if communicating with a broker version 7.2.x and above.

To change the default, see your JVM documentation. On some JVM implementations, it can be changed with the `file.encoding` property.

Which encodings are valid depends on the version of your JVM. For a list of valid encodings, see *Supported Encodings* in your Java documentation. The encoding must also be a supported codepage of the broker, depending on the internationalization approach.

Starting the Java RPC Server

▶ To start the Java RPC Server

- Use a shell script in the subfolder *bin* of the installation directory.

On Windows, the shell script is named *jrpcserver.bat*.

If the Java interpreter is not called "java", change the call to "java".

- You can set the environment variable `JAVA_HOME` for the location of the Java interpreter.
- Set the classpath to "entirex.jar" and the path to the generated proxies.
- The Java RPC Server accepts parameters. See column **Command-line options** in table above.

Stopping the Java RPC Server

▶ To stop the Java RPC Server

- Use the function **Deregister a Service** or **Deregister a Server** of the System Management Hub. This method ensures that the deregistration from the Broker is correct.

Running the Java RPC Server as a Windows Service

For general information and for information on installing and tracing the Windows service see *Administering the EntireX RPC Server* in the Windows administration documentation and [Running an EntireX RPC Server as a Windows Service](#).

▶ To run the Java RPC Server as a Windows Service

- 1 Customize *jrpcserver.bat* (or any other script file) according to your system installation. See [Starting the Java RPC Server](#).



Note: The script file must pass external parameters to the RPC server and use the reduced signaling of the JVM (option `-Xrs`):

```
java -Xrs com.softwareag.entirex.aci.RPCServer BrokerId ServerAddress %*
```

If `-Xrs` is not used, the JVM stops and an entry 1016 4002 is written to the event log when a user logs off from Windows.

- 2 Test your server installation to see whether it will start if you run your script file.
- 3 Install RPCService with some meaningful extension, for example:

```
RPCService -install -ext <ext> -script ↵  
"<drive>:\SoftwareAG\EntireX\bin\jrpcserver.bat"
```

- 4 In Windows Services menu (**Control Panel > Administrative Tools > Services**) select the service: Software AG EntireX RPC Service [`<ext>`]

and change the property Startup Type from "Manual" to "Automatic".

Application Identification

The application identification is sent from the RPC server to the Broker. It is visible with Broker Command and Info Services.

The identification consists of four parts: name, node, type, and version. These four parts are sent with each Broker call and are visible in the trace information.

For the Java RPC Server these values are:

Identification Part	Value
Application name:	ANAME=Java RPC Server
Node name:	ANODE=<host name>
Application type:	ATYPE=Java
Version:	AVERS=8.2.0.0

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Administering the EntireX XML/SOAP RPC Server

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With the XML/SOAP RPC Server you can process XML-based server calls from EntireX RPC clients/Natural RPC clients. The EntireX RPC client communicates with the XML-based server, using the XML/SOAP RPC Server.

Administering the EntireX XML/SOAP RPC Server

The XML/SOAP RPC Server uses the following, in the following order of priority:

1. Command-line Parameters

The command-line parameters have the highest priority.

2. Properties File

The properties file is located in the working directory by default. It should define parser settings and the location of the configuration file. The default name of the properties file is *entirex.xmlrpcserver.properties*. Furthermore it may contain several properties for the server (see the table below).

3. Configuration File

The configuration file (XML format) has the lowest priority. It contains a list of target servers, including the mapping file associated with them and may contain information about the broker if not already given in the command-line or property file.

If the properties file does not specify the location and name of the configuration file, the configuration file in the working directory is used.

Additionally, Java System properties are available to administer the XML/SOAP RPC Server. These properties are independent of the administration possibilities listed above.

Java System Property	Description	Values	Default
<code>http.keepAlive</code>	Enable/disable HTTP persistence	true, false	true
<code>http.maxConnections</code>	Define the maximum number of HTTP connection to a host. Note: Requires <code>http.keepAlive=true</code>	Integer > 0	5

Command-line Parameters

Name	Command-line Option	Default Value	Explanation														
entirex.server.brokerid	-broker	localhost	Broker ID														
entirex.server.codepage	-codepage		The codepage the server uses. The default values are the names of the codepages that the JVM supports. Use the value that is the default codepage of the JVM that is used. See <i>Using Internationalization in EntireX XML Components under Windows</i> and <i>Advanced Applications with the Java A Wrapper</i> for details.														
entirex.server.compresslevel	-compresslevel	0 (no compression)	Permitted values (you can enter either the numeric value): <table border="1"> <tr> <td>BEST_COMPRESSION</td> <td>9</td> </tr> <tr> <td>BEST_SPEED</td> <td>1</td> </tr> <tr> <td>DEFAULT_COMPRESSION</td> <td>-1</td> </tr> <tr> <td>DEFLATED</td> <td>8</td> </tr> <tr> <td>NO_COMPRESSION</td> <td>0</td> </tr> <tr> <td>N</td> <td>0</td> </tr> <tr> <td>Y</td> <td>8</td> </tr> </table>	BEST_COMPRESSION	9	BEST_SPEED	1	DEFAULT_COMPRESSION	-1	DEFLATED	8	NO_COMPRESSION	0	N	0	Y	8
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BEST_SPEED	1																
DEFAULT_COMPRESSION	-1																
DEFLATED	8																
NO_COMPRESSION	0																
N	0																
Y	8																
entirex.server.development.relativepaths		false	The file locations of deployed WSDL files are written as relative paths in the configuration file of the XML Server.														
entirex.server.environment			Can be used in a user-written script to set the environment at exit of the Broker. See BrokerEnvironment.setEnvironment(java.lang.String) (EntireX Java ACI) in the Java A Wrapper documentation of the Java A Wrapper.														
entirex.server.fixedservers		no	If no, use attach server to manage server threads, otherwise run minimum number of server threads.														
entirex.server.logfile	-logfile		Path and name of the trace log file. Environment variables in the path are resolved only if used as a command-line option.														
entirex.server.maxservers		32	Maximum number of worker threads.														
entirex.server.minservers		1	Minimum number of server threads.														

Name	Command-line Option	Default Value	Explanation
entirex.server.monitorport	-smhport	0	The port where the server listens for commands from the System Management Hub (SMH). If this port is 0, no port is used and the management by the SMH is disabled.
entirex.server.name			The name of the server.
entirex.server.password	-password		The password for secured access to the Broker. For Java 1.4 and above, the password is encrypted and written to the properties file <code>entirex.server.password.e</code> . To change the password, set the new password in the properties file (default is <code>entirex.server.properties</code>). To disable password encryption, set <code>entirex.server.passwordencryption</code> to <code>no</code> . Default for this property is <code>yes</code> . For Java 1.3 and below, password encryption is not available.
entirex.sdk.xml.runtime.propertyfile	-propertyfile	entirex.xmlrpcserver.properties	The file name of the property file.
entirex.sdk.xml.runtime.configurationfile	-configurationfile	entirex.xmlrpcserver.configuration.xml	Location and name of configuration file.
entirex.server.restartcycles	-restartcycles	15	Number of restart attempts if the Broker is not available. This can be used to keep the Java RPC Server running while the Broker is down for a short time.
entirex.server.security	-security	no	no/yes/auto/Name of BrokerSecurity
entirex.server.serveraddress	-server	RPC/SRV1/CALLNAT	Server address.
entirex.server.serverlog	-serverlog		Name of the file where start and stop of worker threads is logged. Used by the Windows RPC Service.
entirex.server.userid	-user	JavaServer	The user ID for the Broker for RPC. See <code>entirex.server.password</code> .
entirex.server.verbose	-verbose	no	Verbose output to standard output.
entirex.server.waitattach		600S	Wait timeout for the attach server threads.
entirex.server.waitserver		300S	Wait timeout for the worker threads.
entirex.timeout		20	TCP/IP transport timeout. See <i>Setting Transport Timeout</i> under <i>Writing Advanced Applications - EntireX Java ACI</i> .
entirex.trace	-trace	0	Trace level (1,2,3).

Name	Command-line Option	Default Value	Explanation
entirex.sdk.xml.runtime.xmlparserfactory	-jaxp.saxparserfactory	com.ctc.wstx.stax.WstxInputFactory	Location and name of stream class.
entirex.sdk.xml.runtime.useCharacterReference		no	Enables or disables the usage of character references. Defined value = yes
entirex.sdk.xml.runtime.defaultFaultDocumentFormat		soap	Define the protocol used for fault document generation if no fault document is specified. Defined values = soap, xml.

Sample Properties File

The following is a sample properties file *entirex.xmlrpcserver.properties*:

```
# Example server configuration
#
# parameter for xml stream parser
entirex.sdk.xml.runtime.xmlparserfactory=com.ctc.wstx.stax.WstxInputFactory
# xmlruntime configuration file
entirex.sdk.xml.runtime.configurationfile=entirex.xmlrpcserver.configuration.xml
#
# Basic properties
entirex.server.brokerid=localhost
entirex.server.serveraddress=RPC/XMLSERVER/CALLNAT
entirex.server.userid=XMLRPCServer
```

Configuration File for the XML/SOAP RPC Server

- [Introduction](#)
- [Sample Configuration File](#)
- [TargetServer Block](#)

Introduction

The configuration file for the EntireX XML/SOAP RPC Server is written in XML format.

The document frame is:

```
<?xml version="1.0" encoding="UTF-8" ?>
<EntireX xmlns="http://namespaces.softwareag.com/entirex/xml/runtime/configuration"
version="7.2.1" >
  <XmlRuntime Version="1">
    <!-- information for XML/SOAP RPC Server-->
  </XmlRuntime>
</EntireX>
```

The default name of the configuration file is *entirex.xmlrpcserver.configuration.xml*.

The XMLRPCServer information contains two information blocks, one for the EntireX Broker information and one for a list of target servers.

Sample Configuration File

```
<?xml version="1.0" encoding="UTF-8" ?>
<EntireX
xmlns="http://namespaces.softwareag.com/entirex/xml/runtime/configuration"
version="8.0">
  <XmlRuntime Version="1">
    <BrokerInfo>
      <BrokerId>localhost:1971</BrokerId>
      <ServerAddress>RPC/SRV1/CALLNAT</ServerAddress>
      <Logical_BrokerId></Logical_BrokerId>
      <Logical_Service></Logical_Service>
      <Logical_SetName></Logical_SetName>
      <Options/>
    </BrokerInfo>

    <TargetServer name="http://localhost:1973/MyService">
      <xmms>
        <exx-xmm name="c:\mydir\xmmfiles\XmmExample.xmm"
          soapVersion="1.1"
          wsd1="c:/mywsdl.wsdl" service="myservice"
          port="myserviceSOAP11Port" repository="c:\myrepository"\>
        </xmms>
      </TargetServer>
    </XmlRuntime>
  </EntireX>
```

TargetServer Block

The section <TargetServer>

- specifies a Web service address (currently only http(s) is possible)
- contains the IDL-XML mapping files (XMM)
- allows specification of basic authentication with a fixed user/password within the tag <Target-Server>:


Attribute	Req/ Opt	Description
basicAuthentication	O	<p>true Activate the basic authentication. If attributes <code>user</code> and <code>password</code> are set, these credentials are used for basic authentication. Otherwise the current credentials of the calling client are used. To set the basic authentication credentials on client side, the Natural logon must be enabled. User-specific credentials can be overwritten by setting RPC user ID and RPC password in the client application.</p> <p>false Deactivate basic authentication. All other parameters in this table are ignored.</p>
user	O	Name of default user for basic authentication.
password	O	Password of default user for basic authentication.
password-encryption	O	<p>Specifies how the password is encrypted. Possible values:</p> <p>plainText Default.</p> <p>base64</p> <p>encrypt The XML/SOAP RPC Server encrypts the password and sets this value.</p>
httpConnectionTimeout	R	HTTP connection timeout in seconds.

See *Reference - HTTP and Java Interface* in the XML/SOAP Wrapper documentation for explanation of attributes.

The section <xmm> contains the optional attributes for SOAP mapping.

Attribute	Description
soapVersion	Specifies a SOAP version: 1.1 (default) or SOAP 1.2.
wSDL	The location of WSDL file, using a WSDL file the target address is retrieved from WSDL file.
service	The service name in WSDL file.
port	The port name in WSDL file.
repository	The repository directory used for WS-* features. See Software AG Common Web Services Stack client repository.
usernameToken	Valid values: PasswordText PasswordDigest. Prerequisites: Attribute repository must be defined and module rampart must be engaged. See also XML/SOAP RPC Server with UsernameToken .

The list of target servers (based on the target server entries starting with tag TargetServer and have a mandatory HTTP address) is assigned to the attribute name. Each TargetServer entry can have a list of XMMs for this server.

 **Caution:** It is not allowed to use one XMM in more than one TargetServer entry inside one configuration file. Using different XMMs with a common definition results in unexpected behavior of XML/SOAP RPC Server.

Configuring the XML/SOAP RPC Server

▶ To configure the XML/SOAP RPC Server

- 1 Specify the file *entirex.xmlrpcserver.properties* in the directory where the XML/SOAP RPC Server is started.
- 2 Specify the JAXP parameters. This step is optional if these parameters are already specified in your environment.
- 3 Specify the location of the configuration file.
- 4 Specify the configuration file: *entirex.xmlrpcserver.configuration.xml*.
- 5 For specifying features such as WS-Policy, see also configuration of Software AG Common Web Services Stack.

 **Tip:** If you are using the XML/SOAP RPC Server with an HTTP server located outside the firewall, set the following Java properties:

- http.proxyHost
- http.proxyPort
- https.proxyHost

- `https.proxyPort`
- `http.nonProxyHosts`
- `https.nonProxyHosts`
- `http.proxyUser`
- `https.proxyUser`
- `http.proxyPassword`
- `https.proxyPassword`

XML/SOAP RPC Server with HTTP Basic Authentication

The XML/SOAP RPC Server uses basic authentication for a Web service if the configuration contains the attribute `basicAuthentication` block in `<TargetServer>`. Basic authentication is used for all calls associated with defined XMM files for the `<TargetServer>`.

Basic authentication can be used with fixed credentials or credentials set from the client application:

- If `<TargetServer>` contains attributes `user` and `password`, these settings are used for basic authentication.
- Otherwise the client application must provide the credentials: Enable Natural logon and set RPC user ID and RPC password.

See [Configuration File for the XML/SOAP RPC Server](#).

XML/SOAP RPC Server with UsernameToken

The XML/SOAP RPC Server uses UsernameToken security for a Web service if the configuration contains the attribute `usernameToken` in `<xmm>`. The XML/SOAP RPC Server supports two kinds of UsernameToken:

- `PasswordText`
- `PasswordDigest`

The XML/SOAP RPC Server configuration must define the repository, for example:

```
<exx-xmm name="AService.xmm" soapVersion="1.1"
repository="myrepository" usernameToken="PasswordText" />
```

The repository must contain module `rampart`. In the configuration file (`axis2.xml`) the `rampart` module must be engaged (`<module ref="rampart"/>`) and the phase `PreSecurity` can be empty (`<phase name="PreSecurity" />`).

In the client application, the `Natural logon` must be set. Additionally the client application should set RPC user ID and RPC password.

See [Configuration File for the XML/SOAP RPC Server](#).

Using SSL or TLS with the XML/SOAP RPC Server

Using HTTPS with XML/SOAP RPC Server requires setting Java properties and changing the protocol from `http` to `https` in the configuration file. This section covers the following topics:

- [SSL or TLS Settings](#)
- [Sample Start Script](#)
- [Configuration File Settings](#)

See also [Configuration File for the XML/SOAP RPC Server](#).

SSL or TLS Settings

▶ To configure SSL communication for the JRE

- Set the following properties:
 - **-Djavax.net.ssl.keyStore=<filename-without-blanks>**
Here we keep the certificate and the private signing key of our client application, which is the EntireX XML/SOAP RPC Server.
 - **-Djavax.net.ssl.keyStorePassword=<you-should-know-it>**
The password that protects the keystore.
 - **-Djavax.net.ssl.keyStoreType=pkcs12**
If not `jks` (default).
 - **-Djavax.net.ssl.trustStore=<filename-without-blanks>**
Here we keep the trusted certificate of the Web service host or the certificate of its signing (issuing) certificate authority.

- **-Djavax.net.ssl.trustStorePassword=<you-should-know-it>**
The password that protects the truststore.
- **-Djavax.net.ssl.trustStoreType=**
If not jks (default).

For more information about Java and SSL, see your Java documentation (JSSE documentation).

Sample Start Script

```
set CLASSPATH=.;\classes\entirex.jar;..\WS-Stack\lib\wsstack-client.jar

set PROXYSETTINGS=-Dhttps.proxySet=true
-Dhttps.proxyHost=sslproxy.mydomain
-Dhttps.proxyPort=443
-Dhttps.nonProxyHosts="localhost"

set SSL=-Djavax.net.ssl.keyStore=C:\mykeystore.p12
-Djavax.net.ssl.keyStorePassword=mykeystorePassword
-Djavax.net.ssl.keyStoreType=pkcs12
-Djavax.net.ssl.trustStore=C:\myTrustStore.jks
-Djavax.net.ssl.trustStorePassword=myTruststorePassword

java -classpath %CLASSPATH% %SSL% %PROXYSETTING% ↵
com.softwareag.entirex.xml.rt.XMLRPCServer
```

For the changes that are required to the start script, see your Java documentation (JSSE documentation).

Configuration File Settings

Specify the fully qualified host name as TargetServer. The host name has to match the CN (Common Name) item of the host certificate.

```
<?xml version="1.0" encoding="iso-8859-1" ?>
<EntireX
xmlns="http://namespaces.softwareag.com/entirex/xml/runtime/configuration" ↵
version="8.0"
>
  <XmlRuntime Version="1">
    <BrokerInfo>
      <BrokerId>localhost:1971</BrokerId>
      <ServerAddress>RPC/XMLSRV1/JAVA</ServerAddress>
    </BrokerInfo>
    <TargetServer name="https://targethost:8080/entirex/xmlrt">
      <xmms>
        <exx-xmm name="yourFile1.xmm" />
        <exx-xmm name="yourFile2.xmm" />
      </xmms>
    </TargetServer>
  </XmlRuntime>
</EntireX>
```

```
</TargetServer>  
</XmlRuntime>  
</EntireX>
```

Java API for XML/SOAP RPC Server

The Java API for XML/SOAP RPC Server is a functional extension to the XML/SOAP RPC Server. It allows you to direct the calls to a Java object instead of a Web service (via HTTP(s)). The usage of Java API for XML/SOAP RPC Server is similar to what is known for the XML/SOAP RPC Server. It only differs in the start script and a new (additional) keyword in the configuration file. See [Configuring the XML/SOAP RPC Server](#) above.

- [Properties File](#)
- [Configuration File](#)
- [Implementation of the Java API for XML/SOAP RPC Server](#)
- [Start Script](#)

Properties File

The property file is the same as the [Sample Properties File](#) for the XML/SOAP RPC Server.

Configuration File

The Java API for XML/SOAP RPC Server also uses the same configuration file as the XML/SOAP RPC Server.

The services (programs) directed to the Java interface of the XML/SOAP RPC Server have to use a special keyword “xmlrpcServerClass” as the value of the attribute “Targetserver”. A mixture of targetserver with Java and http-interface is also possible.

Example:

```
<?xml version="1.0" encoding="UTF-8" ?>
<EntireX
xmlns="http://namespaces.softwareag.com/entirex/xml/runtime/configuration"
version="8.3"
>
<XmlRuntime Version="1">
<BrokerInfo>
<BrokerId>localhost:1971</BrokerId>
<ServerAddress>RPC/SRV1/CALLNAT</ServerAddress>
</BrokerInfo>
<TargetServer name="xmlrpcServerClass">
<xmms>
<exx-xmm name="java-service1.xmm" />
<exx-xmm name="java-service2.xmm" />
<exx-xmm name="java-service3.xmm" />
</xmms>
</TargetServer>
<TargetServer name="http://myWebService">
<xmms>
<exx-xmm name="http-service1.xmm" />
<exx-xmm name="http-service2.xmm" />
</xmms>
</TargetServer>
</XmlRuntime>
</EntireX>
```

Implementation of the Java API for XML/SOAP RPC Server

The Java API for XML/SOAP RPC Server requires a user-written Java class initializing the XML/SOAP RPC Server and implementing the XMLRPCServerInterface.

Example:

```
import java.util.Properties;
import com.softwareag.entirex.xml.rt.XMLRPCServerInterface;
import com.softwareag.entirex.xml.rt.XMLRPCServer;
public class MyXMLRPCServer implements XMLRPCServerInterface
{
    public MyXMLRPCServer ()
    {
        XMLRPCServer xmlRpcServer = new XMLRPCServer();
        // register your implementation of XMLRPCServerInterface
        xmlRpcServer.registerXMLRPCServerClass ((XMLRPCServerInterface) this);
        // start XML/SOAP RPC Server with arguments (same as command line)
        xmlRpcServer.start(new String[0]);
    }

    // mandatory method invoke (from XMLRPCServerInterface)
    // - thread synchronization must be done by application if required
    // - properties object contains property "charset" (as used in xml-declaration)
    // and property "java.charset" - the corresponding Java codepage
    // - Exception thrown from this method is mapped to error class 2000 and error ↵
number 200,
    // with exception information in errortext

    public byte[] invoke(byte[] requestDocument, Properties properties)
        throws Exception
    {
        byte[] response = null;
        // TODO <insert application code here>
        return response;
    }

    public static void main(String[] args)
    {
        MyXMLRPCServer myServer = new MyXMLRPCServer ();
    }
}
```

Start Script

The XML/SOAP RPC Server with Java interface must be started by implementing XMLRPCServer-Interface as in this example:

```
java -classpath "%PARSER%;%CLASSPATH%" MyXMLRPCServer
```

Starting the XML/SOAP RPC Server

▶ To start the XML/SOAP RPC Server

- Use the shell script *jxmlrpcserver* in the subfolder *bin* of the installation directory.

Or:

At the command prompt, enter:

```
java com.softwareag.entirex.xml.rt.XMLRPCServer
```

If the Java interpreter is not called "java", change the call to "java".

- You can set the environment variable `JAVA_HOME` for the location of the Java interpreter.
- Set the classpath to `entirex.jar` and the path to the generated proxies.
- The XML/SOAP RPC Server accepts two unnamed parameters, the Broker ID and the server address. Default values are `localhost:1971` and `RPC/SRV1/CALLNAT`.

Stopping the XML/SOAP RPC Server

▶ To stop the XML/SOAP RPC Server

- Use the function `Deregister a Service` or `Deregister a Server` of the System Management Hub. This method ensures that the deregistration from the Broker is correct.

Running the XML/SOAP RPC Server as a Windows Service

For general information, see *Administering the EntireX RPC Server* in the Windows administration documentation or for information on installing and tracing the Windows service, see [Running an EntireX RPC Server as a Windows Service](#).

▶ To run the XML/SOAP RPC Server as a Windows Service

- 1 Customize *jxmlrpcserver.bat* (or any other script file) according to your system installation. See [Running the XML/SOAP RPC Server as a Windows Service](#).



Note: The script file must pass external parameters to the RPC server:

```
java com.softwareag.entirex.xml.rt.XMLRPCServer BrokerId ServerAddress %*
```

- 2 Test your server installation to see whether it will start if you run your script file.
- 3 Install RPCService with some meaningful extension, for example:

```
RPCService -install -ext <ext> -script  
"C:\SoftwareAG\EntireX\bin\jxmlrpcserver.bat"
```

- 4 In Windows Services menu (**Control Panel > Administrative Tools > Services**) select the service: Software AG EntireX RPC Service [*<ext>*]

and change the property Startup Type from "Manual" to "Automatic".

Running the XML/SOAP RPC Server in the Software AG Runtime

This section covers the following topics:

- [Introduction](#)
- [Configuration](#)
- [Deactivating an XML/SOAP RPC Server Permanently](#)
- [Starting and Stopping the XML/SOAP RPC Server using JMX \(Java Management Extensions\)](#)
- [Starting and Stopping the XML/SOAP RPC Server under Windows](#)

See also *XML/SOAP RPC Server in the Software AG Runtime* under *Frequently Asked Questions (FAQ) and Troubleshooting* in the XML/SOAP Wrapper documentation.

Introduction

The Software AG Common Platform is a Java runtime environment based on the OSGi framework. It provides a standard platform on which to run Software AG products and the enterprise applications you develop around those products. The Software AG Common Platform provides common infrastructure for user authentication, event handling, and the execution of Web applications. Infrastructure components that the Software AG Common Platform provide include Software AG Security Infrastructure, Software AG Web Server based on Apache Tomcat, and Web Services Stack.

The Software AG Runtime is an installable instance of the Software AG Common Platform that functions as a stand-alone Tomcat server and a container for Web applications. EntireX uses the Software AG Runtime to host the EntireX XML/SOAP Listener and XML/SOAP RPC Server.

The Software AG Web Server based on Apache Tomcat is one of the basic infrastructure components provided by the Software AG Common Platform. It provides HTTP/HTTPS services, a JSP engine, and a servlet container. Unlike a typical Tomcat implementation, the Software AG Web Server is OSGi-based and supports both .WAR-based and .WAB-based web applications.

During startup, the Software AG Web Server (service name: Software AG Runtime), including the EntireX bundle, looks in the EntireX profile for file `<Installation home>/EntireX/etc/EXX/workspace/entirex.servers.properties`. This file defines an XML/SOAP RPC Server as within `entirex.xmlrpcserver.properties` and `entirex.xmlrpcserver.configuration.xml` located in the EntireX installation in subdirectory `config` by default.

Configuration

The file `entirex.servers.properties` defines the servers to be started. It is only read during startup of the Software AG Runtime. Set the following properties for each defined server:

Property Name	Description
<code>server.<n>.kind</code>	Must be "XMLRPCServer".
<code>server.<n>.propertiesFile</code>	Path to properties file (Java notation).
<code>server.<n>.configurationFile</code>	Path to configuration file (Java notation).

where `<n>` is a number identifying the server

Example of `entirex.servers.properties`:

```
server.1.kind=XMLRPCServer
server.1.propertiesFile=c:/SoftwareAG/EntireX/config/entirex.xmlrpcserver.properties
server.1.configurationFile=c:/SoftwareAG/EntireX/config/entirex.xmlrpcserver.configuration.xml
server.2.kind=XMLRPCServer
server.2.propertiesFile=c:/SoftwareAG/EntireX/config/entirex.myxmlrpcserver.properties
server.2.configurationFile=c:/SoftwareAG/EntireX/config/entirex.myxmlrpcserver.configuration.xml
```

Deactivating an XML/SOAP RPC Server Permanently

To stop any XML/SOAP RPC Server permanently (including the default XML/SOAP RPC Server), rename the configuration file `entirex.servers.properties` under *EntireX\etc\exx\workspace*, for example to `entirex.servers.properties.bak`.

Starting and Stopping the XML/SOAP RPC Server using JMX (Java Management Extensions)

To start and stop an XML/SOAP RPC Server, open a JMX tool, for example the Java Monitoring and Management Console (`jconsole`), located in the Java *bin* directory (sample path: `C:\Software-AG\jom\w64_160\bin\jconsole.exe`). The tool should be connected to the Software AG Runtime JMX port remotely. The default number of this port is 8044 and is defined in `<Installation home>/profiles/CTP/configuration/config.ini`.

Switch to tab MBeans and select item `com.softwareag.entirex.runtime.rpcserver`. The following operations are available:

Operation	Description
<code>startServer</code>	To start a registered and non-running XML/SOAP RPC Server. The parameter is the service name (e.g. <code>RPC/XMLSERVER/CALLNAT</code>).
<code>stopServer</code>	To stop a running XML/SOAP RPC Server. The parameter is the service name (e.g. <code>RPC/XMLSERVER/CALLNAT</code>).
<code>registeredServer</code>	Returns the list of service names of all configured XML/SOAP RPC Servers.
<code>runningServer</code>	Returns the list of service names of running configured XML/SOAP RPC Servers.
<code>nonRunningServer</code>	Returns the list of service names of non-running configured XML/SOAP RPC Servers.

Starting and Stopping the XML/SOAP RPC Server under Windows

Under Windows, the Software AG Runtime runs as a service and can be started and stopped using the Windows Administrative tools.

System Service

The relevant CTP profile has a Windows service named **Software AG Runtime**. You can see it in the Service dialog from the Windows Control Center. You can start/stop the service from this dialog.

Batch Scripts

The directory '<Installation Home>\ profile\CTP\bin' contains the following scripts to start and stop the Software AG Runtime:

Script	Description
start_runtime.bat	batch script for starting a profile's runtime. If it is an installed service for the profile, it will start the service by default.
stop_runtime.bat	batch script for stopping a profile's runtime. If it is an installed service for the profile and this service has been started, this script will stop the service.

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Administering the EntireX XML/SOAP Listener

■ Introduction	316
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■ XML/SOAP Listener with HTTP Basic Authentication and UsernameToken Authentication for EntireX Authentication	319
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The EntireX XML/SOAP Listener is part of the EntireX XML/SOAP Runtime. It plugs the generated AAR file, including XMM files, into Web servers and so enables the EntireX XML/SOAP Runtime to send and receive XML documents using HTTP/HTTPS to/from a Web server. This component was formerly referred to as “XML Servlet”.

Introduction

The EntireX XML/SOAP Listener requires a servlet-enabled Web server with an installation of Software AG Common Web Services Stack (WSS). See the separate Web Services Stack document-ation. Client programs can access the XML/SOAP Runtime through HTTP/HTTPS interfaces provided in programming environments.

Configuring the XML/SOAP Listener

- [Publishing the XML/SOAP Listener Initialization Parameters](#)
- [XML/SOAP Listener Initialization Parameters](#)
- [EntireX XML Init File](#)
- [External Configuration File for EntireX Web Services](#)

Publishing the XML/SOAP Listener Initialization Parameters

The initialization parameters are set using the packaging wizard.

XML/SOAP Listener Initialization Parameters

Name in Web Services Wrapper	Parameter	Description
Default wait time	exx-default-waittime	Sets the value of the default wait time field to the argument (see <code>setDefaultWaittime</code> of class <code>BrokerService</code> in the Javadoc documentation of the Java ACI).
Servlet internal sweep time	exx-sweeptime	Interval in which the servlet checks and frees unused resources. The default is 60 seconds.
Enable character reference	exx-use-characterreference	Enable/disable the character reference for the XML payload.
Behavior of non-conversation calls	exx-mep	The parameter indicates whether a non-conversational call is finalized with a logoff call to free Broker resource (default), or by means of timeout. The default value for this parameter is "nonConv-with-logoff", which defines that a

Name in Web Services Wrapper	Parameter	Description
		non-conversational call will finish with an additional logoff call (two calls per message). Set <code>exx-mep</code> to "nonConv-without-logoff" to specify that a non-conversational call will finish <i>without</i> logoff call (one call per message); Broker will clean up resources by means of timeout.

EntireX XML Init File

The EntireX init file is generated by the packaging wizard that is called from the context menu of Software AG IDL or XMM files. It contains the XML/SOAP Listener initialization parameters.

External Configuration File for EntireX Web Services

- [Introduction](#)
- [Using an External Configuration File](#)
- [Example of an External Configuration File](#)

Introduction

With an external configuration file you can redefine settings of some of the parameters for an EntireX Web service archive without modifying the EntireX Web service archive itself. This means you can use the same EntireX web service archive in different environments.

Using an External Configuration File

▶ To use an external configuration file

- 1 Define a name and a location for the external configuration file.

In the parameter section of file *axis2.xml*, define a parameter "EntireX-XML-Listener" within a parameter "services". For the attribute "location" in parameter "services", specify an absolute or relative path to the external configuration file. File *axis2.xml* can be found in the *conf* directory or folder of the Web Services Stack Web application.

```
<parameter name="EntireX-XML-Listener">
  <parameter name="services" location="<path for file
    overwriting settings of EntireX services>" />
</parameter>
```

Notes:

1. The path separator is a slash.

2. For determining the location of file *axis2.xml*, see *Configuration > Web Services Stack Runtime > Runtime Configuration* in the Web Services Stack documentation, also available under webMethods Product Documentation on the [Software AG Documentation](#) website.
3. The value of the location can contain operating system variables, for example
`location="%USERPROFILE%/myconfig.xml"`.

2 Define services in the external configuration file.

External configuration files are XML documents with a root element "serviceGroup". A service group is defined as a sequence of one or more services.

To identify the service you are defining, specify an identifier for the attribute "name", for instance `<service name= "service100">`.

To make common settings, that is, settings for all services, use an asterisk as identifier (`<service name= "*">`). Note that an individual setting can override a common setting.

EntireX web service parameters that can be set are defined as sub-elements of "service". See the table below.

Parameter	Description
<code><exx-brokerID></code>	The broker ID to use.
<code><exx-service></code>	The service name is the triple set of server class/server name/service.
<code><exx-userID></code>	The user ID specified here is used for calling the broker.
<code><exx-password></code>	The user ID specified here is used for calling the broker.
<code><exx-password-encryption></code>	Specifies how the password is encrypted in the configuration file. Encryption is performed automatically when the configuration file is read for the first time.
<code><exx-use-security></code>	Possible values: true false.
<code><exx-encryption-level></code>	Possible values: 0 1 2.
<code><exx-rpc-userID></code>	The RPC user ID specified here is used for Natural Security
<code><exx-rpc-password></code>	The RPC Password specified here is used for Natural Security.
<code><exx-natural-security></code>	Enable/Disable the Natural Security (true false).
<code><exx-natural-library></code>	The Natural library to use.

Example of an External Configuration File

```
<?xml version="1.0" encoding="utf-8" ?>
<serviceGroup>
  <!-- Optional section for all EntireX services -->
  <service name="*">
    <exx-brokerID>host:1234</exx-brokerID>
    <exx-service>RPC/SRV1/CALLNAT</exx-service>
  </service>

  <!-- service100 overwrites the service address -->
  <service name="service100">
    <exx-service>RPC/SRV2/CALLNAT</exx-service>
  </service>

  <!-- service101 adds library setting -->
  <service name="service101">
    <exx-natural-library>MYLIB</exx-natural-library>
  </service>
</serviceGroup>
```

XML/SOAP Listener with HTTP Basic Authentication and UsernameToken Authentication for EntireX Authentication

The XML/SOAP Listener allows you to use the user credentials from the incoming request by means of Basic Authentication or UsernameToken. The same credentials are used for EntireX Broker authentication and (Natural) RPC Server authentication. This means you need to make some settings for the EntireX Web service in Web Service Wizard and Configuration Editor.



Note: UsernameToken is part of WS-Security. See [WS-Security UsernameToken Specification](#). See also *Example: Setting up an EntireX Client to Consume a Secured Web Service* in the IDL Extractor for WSDL documentation.

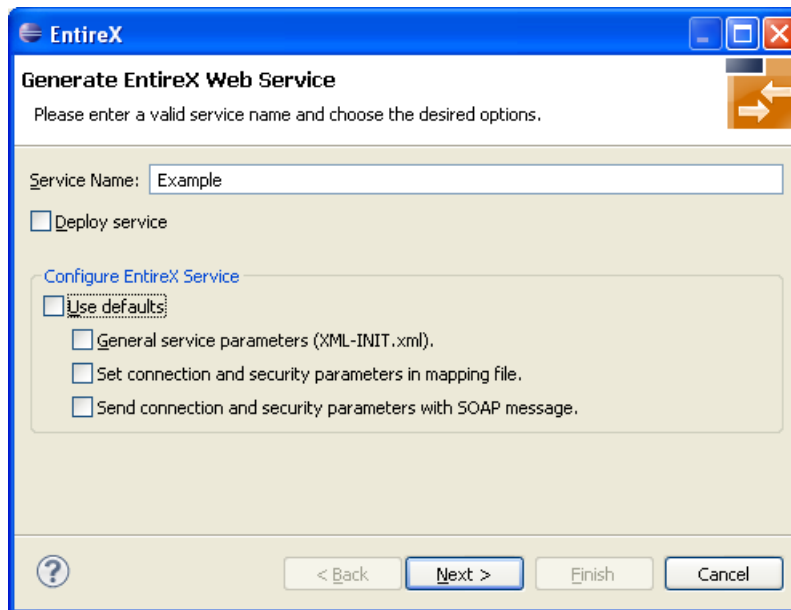
The priority of credentials settings is as follows:

1. exx-userID, exx-password, exx-rpc-userID, exx-rpc-password (highest priority)
2. UsernameToken
3. Basic Authentication (lowest priority)

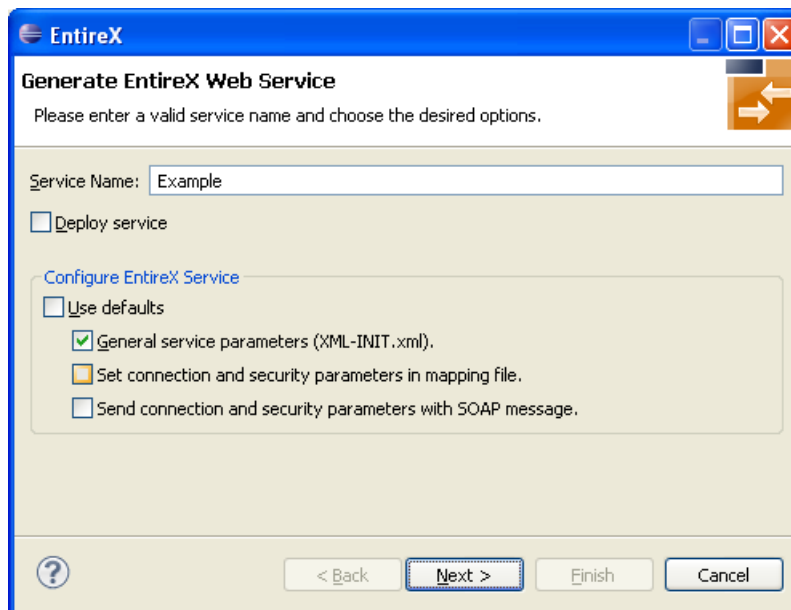
▶ To use the XML/SOAP Listener with Basic Authentication and UsernameToken Authentication

- 1 Select an IDL file or XMM file.
- 2 Choose **Generate Web Service from Software AG...**

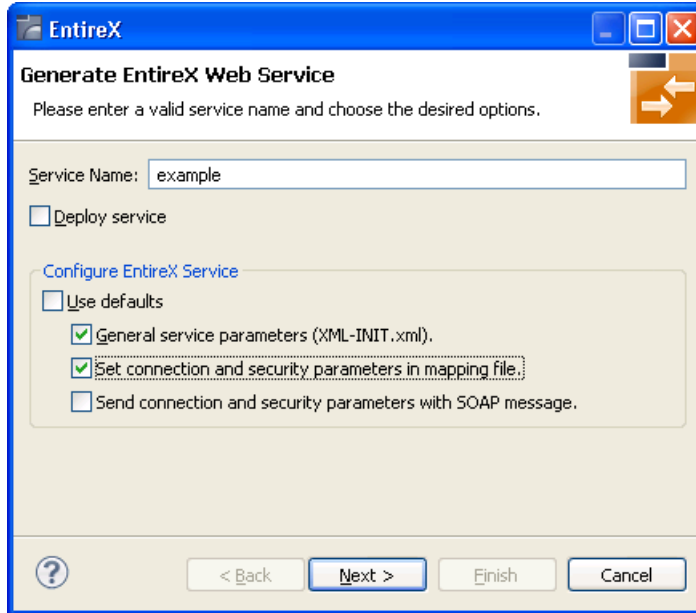
- 3 Disable check box **Use Defaults**.



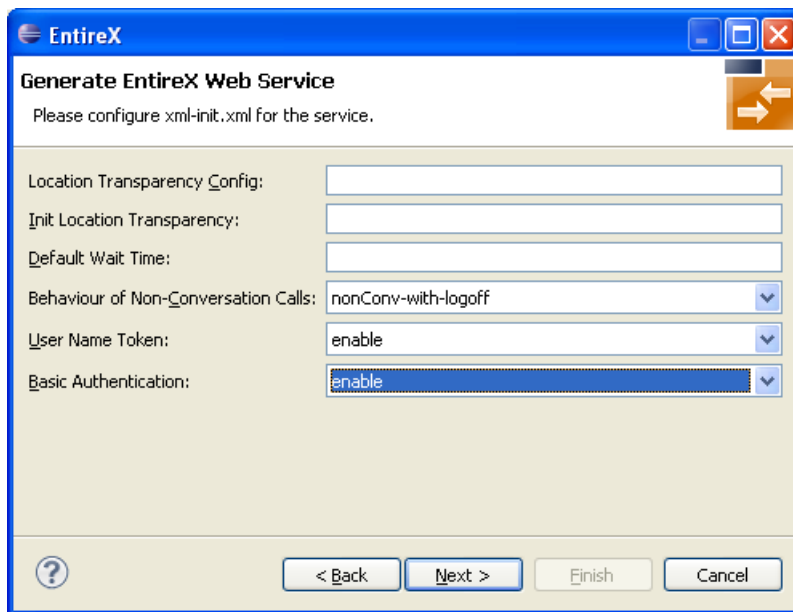
- 4 Enable at least **General service parameters...**



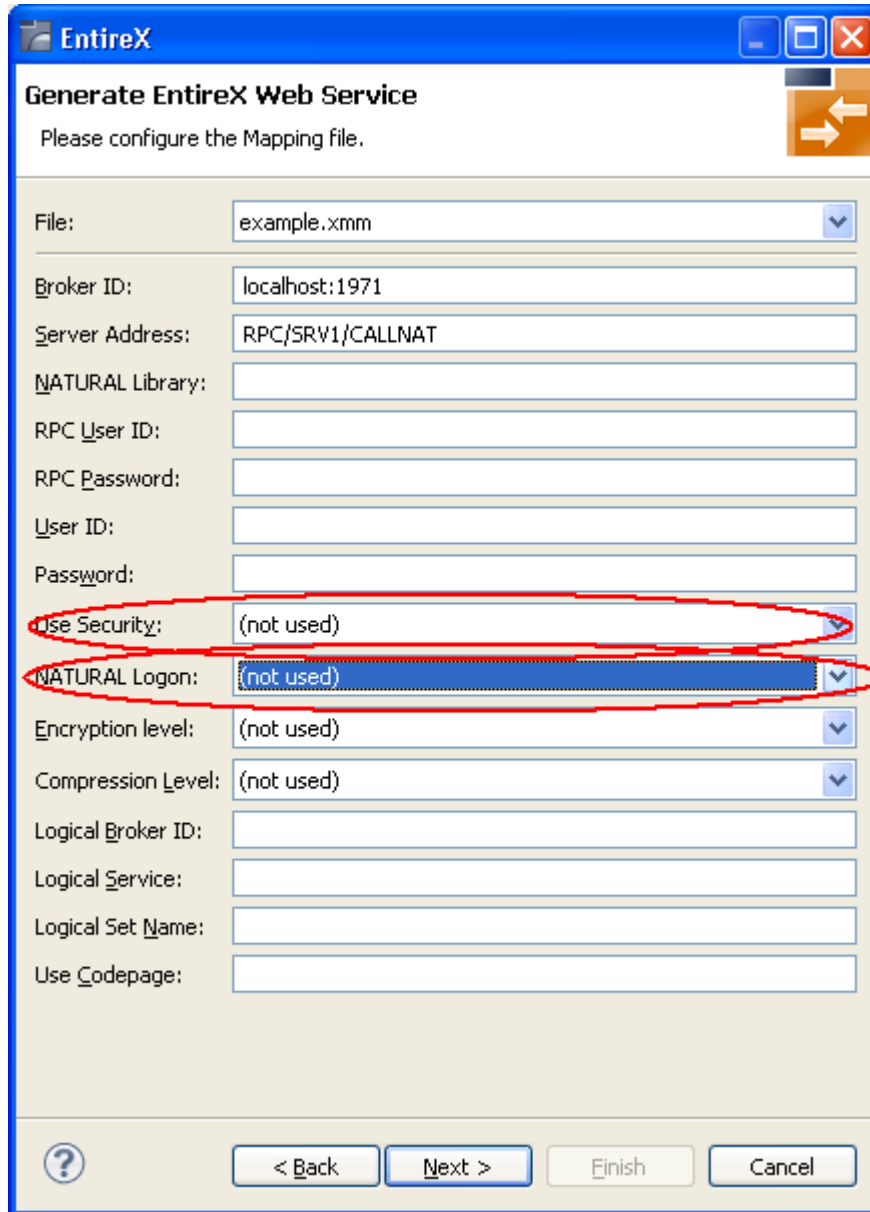
- 5 If using EntireX Security or Natural Security, enable **Set connection and security...** too.



- 6 Press **Next**.
- 7 Enable the required authentication. In this example, both possibilities of web service authentication are enabled.



- 8 Press **Next**.
- 9 The page with XMM settings appears if it was selected before (step 5). Enable the required security (EntireX Security and/or Natural Logon).



- 10 Press **Next** and follow the wizard.
- 11 After generating the web service archive (extension "aar"), open the generated AAR file with the Configuration Editor (e.g. with double click).

For more information on the Configuration Editor see *Configuring Web Services*.

Using Internationalization with the XML/SOAP Listener

The XML/SOAP Listener supports both conversion and translation. See *Internationalization with EntireX* for more information.

26

Configuring Authorization Rules

- Configuration of LDAP (Lightweight Directory Access Protocol) Server 326
- Configuration of Authorization Rule Agent using System Management Hub 327

An authorization rule is used to perform an access check for a particular Broker instance against an (authenticated) user ID and list of rules. Checks are performed on a UNIX or Windows Broker kernel, using standard EntireX Security on these platforms. Authorization rules can be stored within a repository. When an authorization call occurs, the security exit performs checks based on the values of Broker attributes `AUTHORIZATIONDEFAULT` and `AUTHORIZATIONRULE`.

See also [Administering Authorization Rules using System Management Hub](#)

Configuration of LDAP (Lightweight Directory Access Protocol) Server

General Considerations for all LDAP Server Products

An LDAP server is a prerequisite (based on LDAPv3); it is not installed with EntireX.

Tested LDAP servers include IBM Secureway Directory, Microsoft Active Directory. For the installation of the LDAP server, see the respective product documentation. All servers have to support the attribute types `sag-key`, `sag-value` and the object-class `sag-xds`. They are defined in the following schema.

```
attributetypes:  
  ( 1.2.276.0.12.2.1.1  
    NAME 'sag-key'  
    DESC 'User Defined Attribute'  
    SYNTAX '1.3.6.1.4.1.1466.115.121.1.26')  
attributetypes:  
  ( 1.2.276.0.12.2.1.2  
    NAME 'sag-value'  
    DESC 'User Defined Attribute'  
    SYNTAX '1.3.6.1.4.1.1466.115.121.1.5')  
objectclasses:  
  ( 1.2.276.0.12.2.3.1  
    NAME 'sag-xds'  
    DESC 'User Defined ObjectClass'  
    SUP 'top'  
    MUST ( objectclass $ sag-key )  
    MAY ( aci $ sag-value ) )
```

We recommend setting up a separate branch in the directory for authorization rules. The distinguished name of this branch is the value of the configuration setting `baseDN`. See [Configuration of Authorization Rule Agent using System Management Hub](#) below.

Configuration of Authorization Rule Agent using System Management Hub

- [Configuration File xds.ini](#)
- [xds.ini with the LDAP Server](#)
- [xds.ini with a Flat File Directory](#)

Configuration File xds.ini

Edit file *xds.ini* to configure the EntireX authorization rule agent, which is a plug-in of the System Management Hub. *xds.ini* is the configuration of the directory access for authorization rules. This file is needed on each computer that is a managed host for the System Management Hub or where authorization rules are used.

The syntax of this file is the syntax of Windows .ini files. For authorization rules, all lines in the section `[Authorization Rules]` are used. Each line has the format `<key>=<value>`, where `<value>` is the contents of the line after the first '='. The keys are not case-sensitive. Lines starting with ';' are comments.

Under Windows, *xds.ini* is located in `<drive>:\SoftwareAG\EntireX\config`. This configuration in *xds.ini* is used by all other components to access the directory.



Note: If you use read access, an LDAP server with authentication, and only one LDAP user (account), the *xds.ini* is the same on all computers accessing the same directory. Then you can deploy *xds.ini* with a deployment tool.

xds.ini with the LDAP Server

The section for authorization rules looks as follows:

```
[Authorization Rules]
dirService=LDAPDIR
baseDN=<DN>
host=<host>
port=<port>
protocol=<protocol>
authDN=<user>
authPass=<ldap_password>
```


where <code><DN></code>	is the base distinguished name of the directory object that is the root of all objects for authorization rules; <code><DN></code> must not be empty
<code><host></code>	is the host of the LDAP server.
<code><port></code>	is the port of the LDAP server. Default is 389 for TCP communication; default port for SSL is 636

`<protocol>` is either "ldap" (default) for TCP communication, or "ldaps" for SSL

For authenticated access to the LDAP server, use the keywords `authDN` and `authPass`,

where `<user>` is the DN of the user

`<ldap_password>` is the password of this user

 **Caution:** The password is not encrypted in `xds.ini`

For unauthenticated access to the LDAP server, do not include these keywords `authDN` and `authPass` in the `xds.ini`.

Example

```
dirService=LDAPDIR
host=myHost.myDomain
baseDN=dc=myCompany,dc=de
port=389
protocol=ldap
authDN=cn=admin,dc=myCompany,dc=de
authPass=myLdapPassword
```

xds.ini with a Flat File Directory

If a flat file directory is used, the section for authorization rules looks as follows:

```
[Authorization Rules]
dirservice=FLATDIR
file=C:\SoftwareAG\EntireX\config\flat
```

Under Windows, the file is created by the System Management Hub if it does not exist. The folder for the file must exist. The file may be shared over the network and is accessible to all clients. The file must have at least change permission on Windows. If the flat file directory is located on a Windows host, this host must be a Managed Host in the System Management Hub. Only local flat file directories can be written on a Managed Host on Windows.

27 Administering Authorization Rules using System

Management Hub

- Adding a Rule 330
- Adding a Service 331
- Adding a Topic 332
- Adding/Modifying Users 333

An authorization rule is used to perform an access check for a particular Broker instance against an (authenticated) user ID and list of rules. Checks are performed on a UNIX or Windows Broker kernel, using standard EntireX Security on these platforms. Authorization rules can be stored within a repository. When an authorization call occurs, the security exit performs checks based on the values of Broker attributes `AUTHORIZATIONDEFAULT` and `AUTHORIZATIONRULE`.

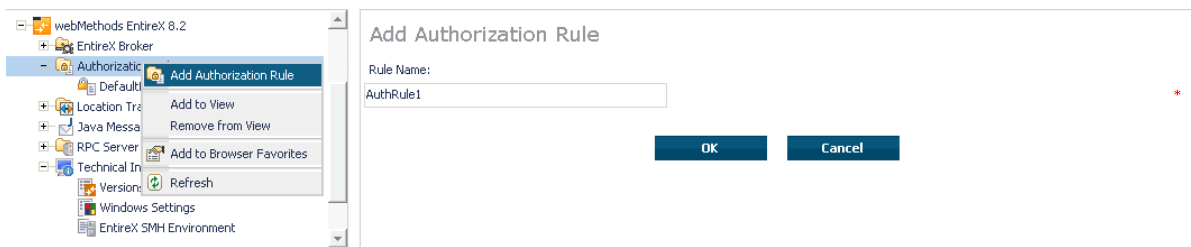
In the System Management Hub, the Authorization Rules agent is found directly under EntireX, which itself is found under a particular managed host where EntireX version 6.1 or above has been installed.

Before you log in to the System Management Hub for the first time, see *Initial Login Considerations* in the System Management Hub for EntireX documentation. See also *System Management Hub for EntireX | [Configuring Authorization Rules](#)*.

Adding a Rule

▶ To add a new authorization rule

- 1 Click on the "+" next to Authorization Rules in the tree view of the System Management Hub window. If no rule has been defined, an empty rule, "DefaultRule", is created. You can modify this default rule, or create a new rule and delete the default.
- 2 Select **Authorization Rules** in the tree view. From the context menu, choose **Add Authorization Rule**. A screen similar to the one below appears.



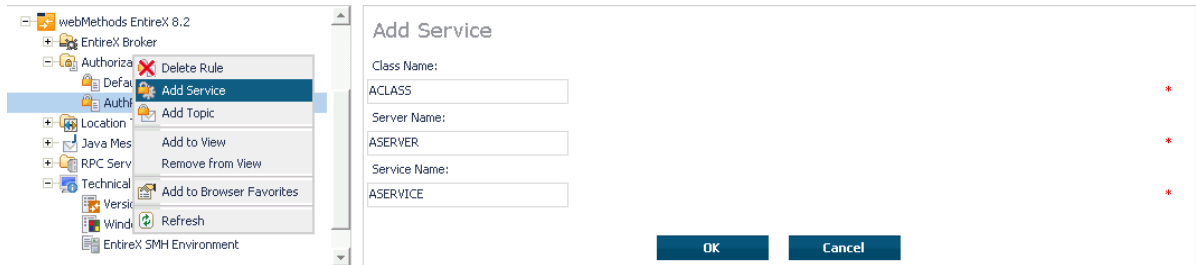
- 3 Enter the name of the rule in the field provided. This field corresponds to Broker attribute `AUTHORIZATIONRULE`.
- 4 Choose **OK**.

This new rule will appear in the tree view in the left frame of the System Management Hub window. If necessary, click the "+" next to **Authorization Rules** in the tree view. You can now add a service to the rule created.

Adding a Service

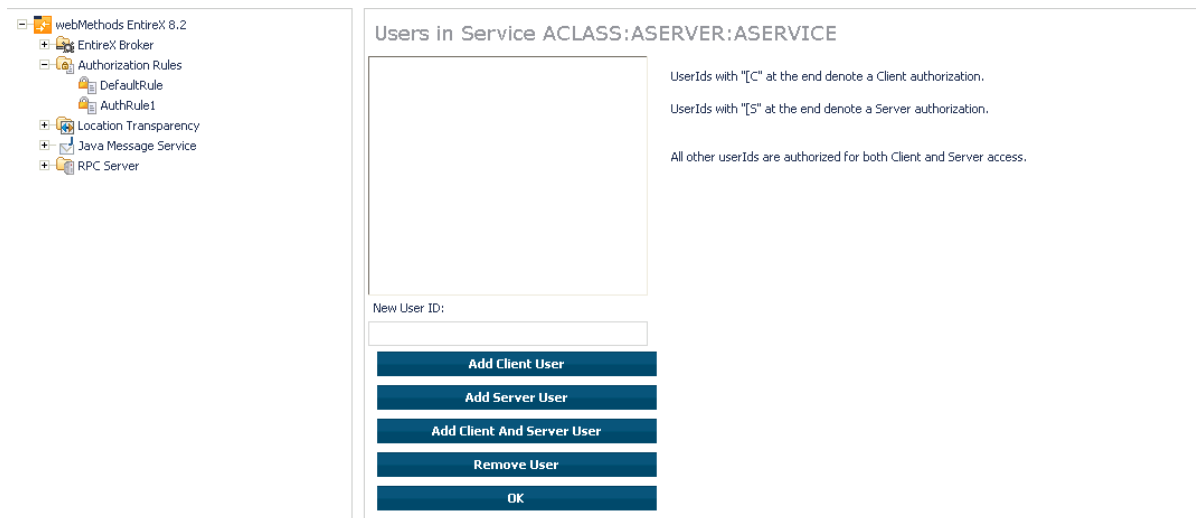
▶ **To add a service**

- 1 Select a rule in the tree view of the System Management Hub.
- 2 From the context menu, choose **Add Service**. A screen similar to the one below appears.



- 3 Enter the information required for the fields Class Name, Server Name, Service Name. These fields correspond to the service-specific Broker attributes CLASS, SERVER, SERVICE.
- 4 Choose **OK** to confirm.

As a result, the following screen appears:



- 5 Enter the users required for the new Service (see [Adding/Modifying Users](#)).
- 6 Click **OK** to confirm.

Adding a Topic

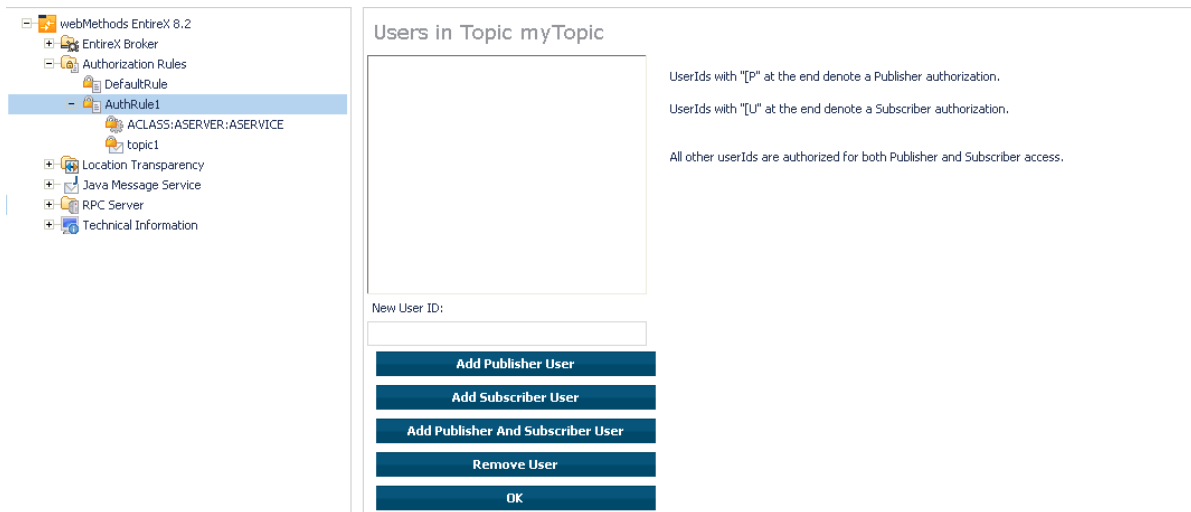
▶ To add a topic

- 1 Select a rule in the tree view of the System Management Hub.
- 2 From the context menu, choose **Add Topic**. A screen similar to the one below appears.



- 3 Enter the information required for the filed Topic Name. This field corresponds to topic-specific Broker attribute TOPIC.
- 4 Choose **OK** to confirm.

As a result, the following screen appears:

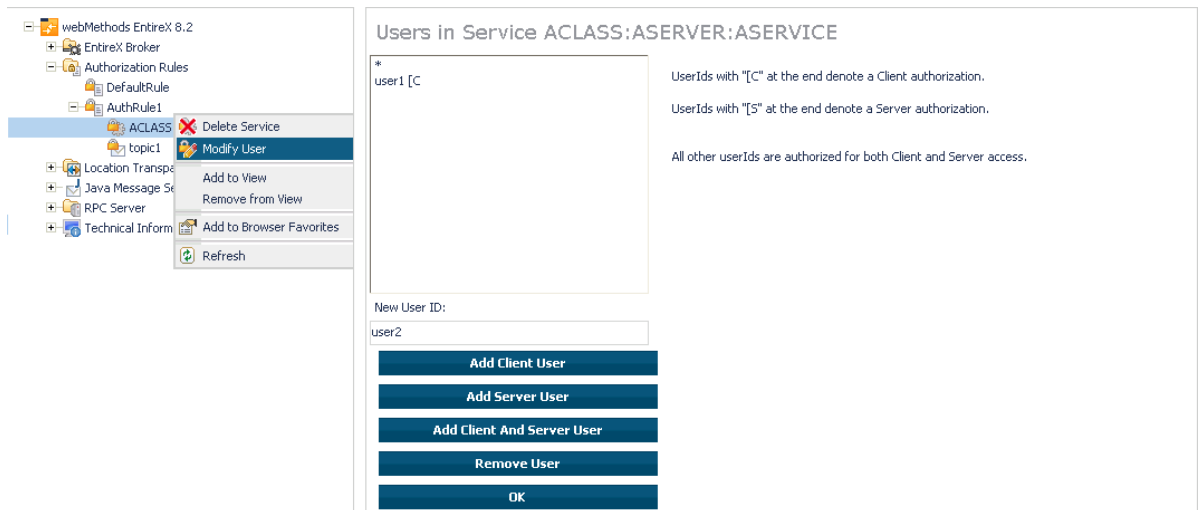


- 5 Enter the rules required for the new Service (see [Adding/Modifying Users](#)).
- 6 Click OK to confirm.

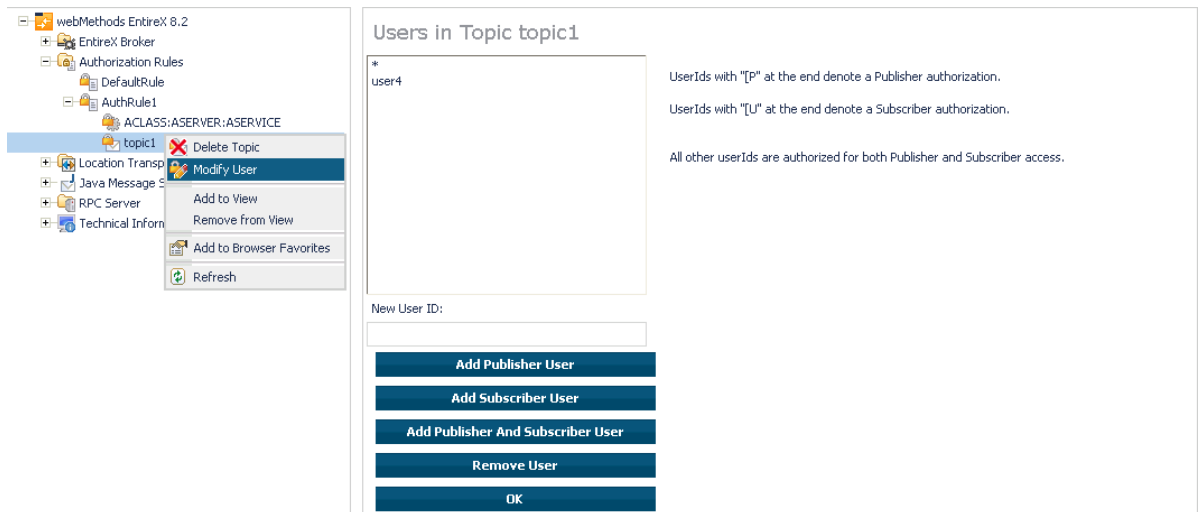
Adding/Modifying Users

▶ To modify users

- 1 Select a service or topic in the tree view of the System Management Hub.
- 2 From the context menu, choose **Modify User**. If a service was selected, a screen similar to the following appears:



- 3 If a topic was selected, a screen similar to the following appears:



- 4 Enter a user ID in the single-line field provided and click **Add** for the desired user type (client, server, publisher or subscriber).

Or:

Remove a user from an existing list by selecting the user and clicking **Remove User**.

5 When the user list is complete, choose **OK** to confirm.



Note: User names are not case-sensitive. Use asterisk notation to define a range of users. For example: user ID "USA*" represents all users whose ID starts with "USA" (including user "USA").

28

Hints for Special LDAP Server Products

- Introduction 336
- Hints for Microsoft Active Directory 336

Introduction

The Lightweight Directory Access Protocol (LDAP) enables a user to locate resources on a corporate intranet or on the public internet. Those resources can be files or devices as well as organizations and individuals. LDAP is smaller than the Directory Access Protocol (DAP) from which it was derived (hence “lightweight”).

In EntireX, LDAP technology is used for authorization rules.

Hints for Microsoft Active Directory

▶ **To deploy the `sagxds` schema on Microsoft Active Directory, do not use the Microsoft Active Directory tools for editing the schema. Use the following step-by-step instructions:**

- 1 Make a backup of the system state. Changes to the schema of Microsoft Active Directory are irreversible without a backup of the system state.
- 2 You must enable UPDATE schema.

1. To make the Schema Master available, enter the following at a command prompt:

```
regsvr32.exe schmmgmt.dll
```

2. Enter: MMC.
 3. From Console menu item select: **add/remove snap-in**.
 4. Choose: **Add**.
 5. Choose: **Active Directory Schema** from **Action** menu item of Active Directory Schema, select: **Operations Master**.
 6. Choose “The schema may be modified on this domain controller”.
 - 3 Copy the following text to the file `sagxds.ldif`

```
# Add sag-value attribute
dn: CN=sag-value,CN=Schema,CN=Configuration,DC=<your domains name>
changetype: add
adminDisplayName: sag-value
attributeID: 1.2.276.0.12.2.1.2
attributeSyntax: 2.5.5.10
cn: sag-value
isSingleValued: FALSE
```

```

LDAPDisplayName: sag-value
distinguishedName: CN=sag-value,CN=Schema,CN=Configuration,DC=<your domains name>
objectCategory:
  CN=Attribute-Schema,CN=Schema,CN=Configuration,DC=<your domains name>
objectClass: attributeSchema
oMSyntax: 4
name: sag-value

# Add sag-key attribute
# Active Directory requires the naming attribute(RDN) to be a syntax of ←
DirectoryString

dn: CN=sag-key,CN=Schema,CN=Configuration,DC=<your domains name>
changetype: add
adminDisplayName: sag-key
attributeID: 1.2.276.0.12.2.1.1
attributeSyntax: 2.5.5.12
cn: sag-key
isMemberOfPartialAttributeSet: TRUE
isSingleValued: TRUE
LDAPDisplayName: sag-key
distinguishedName: CN=sag-key,CN=Schema,CN=Configuration,DC=<your domains name>
objectCategory:
  CN=Attribute-Schema,CN=Schema,CN=Configuration,DC=<your domains name>
objectClass: attributeSchema
oMSyntax: 64
name: sag-key
searchFlags: 1

# Update the schema

DN:
changetype: modify
add: schemaUpdateNow
schemaUpdateNow: 1
-

# Add sag-xds class

dn: CN=sag-xds,CN=Schema,CN=Configuration,DC=<your domains name>
changetype: add
adminDescription: sag-xds
adminDisplayName: sag-xds
cn: sag-xds
defaultObjectCategory:
  CN=sag-xds,CN=Schema,CN=Configuration,DC=<your domains name>
governsID: 1.2.276.0.12.2.3.1
LDAPDisplayName: sag-xds
mayContain: sag-value
mustContain: sag-key
distinguishedName: CN=sag-xds,CN=Schema,CN=Configuration,DC=<your domains name>
objectCategory: CN=Class-Schema,CN=Schema,CN=Configuration,DC=<your domains name>

```

```
objectClass: classSchema
objectClassCategory: 1
possSuperiors: container
name: sag-xds
rDNAttID: sag-key
subClassOf: top

# Update the schema

DN:
changetype: modify
add: schemaUpdateNow
schemaUpdateNow: 1
-

# Modify sag-xds class
# make sag-xds a possSuperior. This means a sag-xds class can contain other ↵
sag-xds classes.

dn: CN=sag-xds,CN=Schema,CN=Configuration,DC=<your domains name>
changetype: modify
add: possSuperiors
possSuperiors: sag-xds
-

# Update the schema

DN:
changetype: modify
add: schemaUpdateNow
schemaUpdateNow: 1
-
```

- 4 Replace all instances of `dc=<your domain name>` with your domain name, i.e. `dc=myunit,dc=my-company,dc=com`
- 5 Run it with the command:

```
ldifde -s <your server> -b <account> <domain> <password> -i -f sagxds.ldif
```

- 6 Add containers which represent the base DN of the logical Broker IDs and logical services. These containers determine the value of base DN in `xds.ini`. Example (for two containers):

```
dn: CN=<your container 1>,DC=<your domain name>
changetype: add
cn: <your container 1>
objectclass: container

dn: CN=<your container2>,<your container 1>,DC= <your domain name>
changetype: add
cn: <your container 2>
objectclass: container
```

- 7 With the utilities for Microsoft Active Directory, set the permissions to read and to modify the containers.

29

Tracing webMethods EntireX

- Table Summarizing Tracing for webMethods EntireX Components 342
- Tracing EntireX Broker 343
- Tracing Broker Agent 344
- Tracing Broker Stubs 345
- Tracing Enterprise JavaBeans 346
- Logging Enterprise JavaBeans 347
- Tracing EntireX Java ACI 347
- Tracing Java RPC Server 348
- Tracing the RPC Runtime 348
- Tracing the RPC Server 350
- Tracing the XML/SOAP Runtime 351
- Tracing the EntireX RPC-ACI Bridge 356

This chapter describes the various techniques available for troubleshooting, tracing and logging with EntireX components.

Table Summarizing Tracing for webMethods EntireX Components

EntireX Component	Use Tracing Technique for	Tracing Technique
Broker ActiveX Control	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing Broker Stubs</i>
EntireX Broker ACI under Windows	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing Broker Stubs</i>
EntireX Broker Agent	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing Broker Agent</i>
EntireX Broker under Windows	Processing within the Broker Requests to, replies from clients/server	<i>Tracing EntireX Broker</i>
DCOM Wrapper	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing Broker Stubs</i>
	RPC-related problems on the client side Requests to, replies from RPC Servers Requests to, replies from the Broker	<i>Tracing the RPC Runtime</i>
EntireX Java ACI	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing EntireX Java ACI</i>
Java Wrapper	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing EntireX Java ACI</i>
Wrapper for EJB	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing Enterprise JavaBeans</i>
	Log information to the application server the JavaBean is executing in	<i>Logging Enterprise JavaBeans</i>
EntireX Java RPC Server	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing Java RPC Server</i>
EntireX IDL Tester		
.NET Wrapper	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing Broker Stubs</i>
	RPC-related problems on the client side Requests to, replies from RPC servers Requests to, replies from the Broker	<i>Tracing the RPC Runtime</i>
C Wrapper	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing Broker Stubs</i>
	RPC-related problems on the client side Requests to, replies from RPC servers Requests to, replies from the Broker	<i>Tracing the RPC Runtime</i>

EntireX Component	Use Tracing Technique for	Tracing Technique
EntireX RPC Server under Windows	RPC-related problems on the server side Requests to, replies from RPC clients Requests to, replies from the Broker	<i>Tracing the RPC Server</i>
	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing Broker Stubs</i>
Broker HTTP(S) Agent	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing EntireX Java ACI</i>
EntireX XML/SOAP RPC Server	For XML/SOAP RPC Server-related problems.	<i>Tracing the XML/SOAP Runtime</i>
	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing EntireX Java ACI</i>
EntireX XML Tester		
EntireX XML/SOAP Listener	For XML/SOAP Listener-related problems.	<i>Tracing the XML/SOAP Runtime</i>
	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing EntireX Java ACI</i>
XML/SOAP Wrapper	For XML/SOAP Wrapper-related problems.	<i>Tracing the XML/SOAP Runtime</i>
	Transport-related problems Requests to, replies from the Broker or Broker Agent	<i>Tracing EntireX Java ACI</i>
EntireX RPC-ACI Bridge		<i>Tracing the EntireX RPC-ACI Bridge</i>

Tracing EntireX Broker

► To switch on tracing

- Set the attribute `TRACE - LEVEL` in the broker attribute file
 - for minimal trace output to "1"
 - for detailed trace output to "2"
 - for full trace output to "3"

Example:

```
TRACE-LEVEL=2
```

▶ **To switch off tracing**

- Set the attribute `TRACE-LEVEL` in the broker attribute file to 0:

```
TRACE-LEVEL=0
```

Or:

Omit the `TRACE-LEVEL` attribute.

▶ **To display the trace file (under Windows)**

- In System Management Hub, select EntireX *n.n.n*, then EntireX Broker, then the Broker ID you are interested in, then choose **Show Log File**.

Trace Output

The trace file, *BrokerID.LOG*, is written to the *Broker Directory* under *Directories as Used in EntireX* in the general administration documentation directory.

Related Information

EntireX Broker Return Codes under *Error Messages and Codes*

Tracing Broker Agent

▶ **To switch on tracing**

- Set the parameter `Trace Option` to ON. For the complete table of parameters, see [Using the SSL Agent](#) and [Using the TCP Agent](#).

▶ **To switch off tracing**

- Set the parameter `Trace Option` to OFF.

Or:

Omit the parameter `Trace Option`.

Trace Output

The trace output will be written to STDOUT.

If the Broker Agent is started with the System Management Hub, the trace output is written to the subfolder *etc* of the EntireX main directory. The file name is *BrokerAgent.<agent name>.log*.

Tracing Broker Stubs

The broker stubs provide an option for writing trace files.

▶ To switch on tracing for the broker stub

- Before starting the client application, set the environment variable `ETB_STUBLOG`:

Trace Value	Trace Level	Description
0	NONE	No tracing.
1	STANDARD	Traces initialization, errors, and all ACI request/reply strings.
2	ADVANCED	Used primarily by system engineers, traces everything from level 1 and provides additional information - for example the Broker ACI control block - as well as transport information.
3	SUPPORT	This is full tracing through the stub, including detailed traces of control blocks, message information, etc.

Example:

```
ETB_STUBLOG=2
```

If the trace level is greater than 1, unencrypted contents of the send/receive buffers may be exposed in the trace.

Trace output, file *<thread-id>.etb*, is written to the trace directory. The location of the trace file depends on the settings of environment variable `%USERPROFILE%`, for example:

```
C:\Documents And Settings\\My Documents\Software AG\EntireX
```

See *Trace Directory* under *Directories as Used in EntireX* in the general administration documentation.

Remember to switch off tracing to prevent trace files from filling up your disk.

▶ **To switch off tracing for the broker stub**

- Set the environment variable `ETB_STUBLOG` to `NONE` or delete it.

Tracing Enterprise JavaBeans

▶ **To switch on tracing**

- Set entry name `Trace` (see *Environment Entries to Control EJB* under *Controlling Applications - EntireX Wrapper for Enterprise JavaBeans*)
 - for minimal trace output to "1"
 - for detailed trace output to "2"
 - for full trace output to "3".

▶ **To switch off tracing**

- Set entry name `Trace` to "0".

Or:

Omit the entry name `Trace`.

Trace Output

The trace output will be written to `STDOUT`.

▶ **To change the directory and name of the trace destination**

- Set the entry name `Logfile` to a valid file name, depending on your operating system.

Logging Enterprise JavaBeans

▶ To switch on logging

- Set entry name `Verbose` to true. (See *Environment Entries to Control EJB* under *Controlling Applications - EntireX Wrapper for Enterprise JavaBeans*.)

▶ To switch off logging

- Set entry name `Verbose` to false.

Or:

Omit the entry name `Verbose`.

Log Output

The log output will be written to STDOUT.

Tracing EntireX Java ACI

The EntireX Java ACI provides a system property for tracing.

▶ To switch on tracing

- 1 When starting the Java virtual machine, set the Java system property `entirex.trace`
 - for minimal trace output to "1"
 - for detailed trace output to "2"
 - for full trace output to "3".
- 2 The programming interface of the EntireX Java ACI allows you to set the trace value by the Java application using the EntireX Java ACI, see *Tracing* under *Writing Advanced Applications - EntireX Java ACI*. There may also be other methods to provide the trace value. See your application documentation.

▶ To switch off tracing

- Set the Java system property `entirex.trace` to 0 when starting the Java virtual machine

Or:

Omit the Java system property `entirex.trace` when starting the Java virtual machine.

Trace Output

The trace output will be written to STDOUT.

Tracing Java RPC Server

▶ To switch on tracing

- When starting the Java virtual machine, set the Java system property `entirex.trace`
 - for minimal trace output to "1"
 - for detailed trace output to "2"
 - for full trace output to "3".

See *Customizing the Java RPC Server*.

▶ To switch off tracing

- Set the Java system property `entirex.trace` to "0" when starting the Java virtual machine.

Or:

Omit the Java system property `entirex.trace` when starting the Java virtual machine.

Trace Output

The trace output will be written to STDOUT.

Tracing the RPC Runtime

▶ To switch on tracing

- Before starting the client application, set the environment variable `ERX_TRACELEVEL` to
 - `STANDARD` for minimal trace output
 - `ADVANCED` for detailed trace output

- SUPPORT for full trace output.

▶ To switch off tracing

- Set the environment variable to NONE or delete it.

Trace Output

By default the trace file, *ERXTrace.nnn.log*, will be written to the trace directory.

The value *nnn* can be in the range from 001 to 005.

▶ To change the trace destination

- Set the environment variable `ERX_TRACEFILE` to the desired destination, which can consist of file names, folder names and variables for file names, folder names, process ID, thread ID, range.

The variables are:

Variable	Operating System	Description
%...%	Windows	environment variable
\$(...)	UNIX	environment variable
@PID	UNIX, Windows	process ID
@TID	UNIX, Windows	thread ID
@RANGE[<i>n,m</i>]	UNIX, Windows	<i>m</i> must be greater than <i>n</i> , range is from 0 - 999
@CSIDL_PERSONAL	Windows	The user's home directory. The variable will be resolved by Windows shell functions.
@CSIDL_APPDATA	Windows	The <i>Application Data Directory</i> under <i>Directories as Used in EntireX</i> in the general administration documentation. The variable will be resolved by Windows shell functions.
@CSIDL_LOCAL_APPDATA	Windows	The <i>Application Data Directory</i> under <i>Directories as Used in EntireX</i> in the general administration documentation. The variable will be resolved by Windows shell functions.

Related Information

Environment Variables in EntireX in the general administration documentation

Tracing the RPC Server

▶ To switch on tracing

- Set the `TraceLevel` parameter in the server configuration file to
 - STANDARD for minimal trace output
 - ADVANCED for detailed trace output
 - SUPPORT for full trace output.

See [Setting Server Parameters for the RPC Server](#).

Tracing can also be switched on and off with the environment variable `ERX_TRACELEVEL`. The settings in the configuration file override the environment variable.

▶ To switch off tracing

- Set the `TraceLevel` parameter in the server configuration file to NONE.

Trace Output

By default the trace file, `ERXTrace.nnn.log`, will be written to the trace directory.

The value `nnn` can be in the range from 001 to 005.

▶ To change the trace destination

- Set the parameter `TraceDestination` in the server configuration file to the desired destination. See [Setting Server Parameters for the RPC Server](#).

The variables are:

Variable	Operating System	Description
%...%	Windows	environment variable
\$(...)	UNIX	environment variable
@PID	UNIX, Windows	process ID
@TID	UNIX, Windows	thread ID
@RANGE[<i>n,m</i>]	UNIX, Windows	<i>m</i> must be greater than <i>n</i> , range is from 0 - 999
@CSIDL_PERSONAL	Windows	The User's Home Directory. The variable will be resolved by Windows shell functions.
@CSIDL_APPDATA	Windows	The <i>Application Data Directory</i> under <i>Directories as Used in EntireX</i> in the general administration documentation. The variable will be resolved by Windows shell functions.
@CSIDL_LOCAL_APPDATA	Windows	The <i>Application Data Directory</i> under <i>Directories as Used in EntireX</i> in the general administration documentation. The variable will be resolved by Windows shell functions.

Related Information

EntireX RPC Server Return Codes under *Error Messages and Codes*

Tracing the XML/SOAP Runtime

This section provides information on tracing the following components:

- EntireX XML/SOAP RPC Server
- EntireX XML/SOAP Listener
- EntireX XML/SOAP Wrapper

The following topics are covered:

- [Enabling Tracing](#)
- [Disabling Tracing](#)
- [Configuring a Trace File for the XML/SOAP Listener](#)
- [Configuring a Trace File for the XML/SOAP Wrapper or the XML/SOAP RPC Server](#)
- [Trace Parameters](#)

- [Component Names](#)

Enabling Tracing

There are two ways to switch on tracing mode:

- [Using a Property File](#)
- [Using Trace Parameters of the Java Virtual Machine](#)

Using a Property File

▶ To switch on tracing mode using a property file

- 1 Copy the trace property file *entirex.trace.standard* to one of the following locations:
 - the working directory of your client application;
 - the user's home directory;
 - any other location.
- 2 Rename the copied file *entirex.trace.properties*.
- 3 Customize *entirex.trace.properties* as described in [Trace Parameters](#).
- 4 If *entirex.trace.properties* is within the current directory of your client application or your user home directory, it will be located automatically.

Otherwise, specify the fully qualified or relative file name when starting the Java virtual machine for your client application using property `entirex.sdk.default.trace.propertiesfile`, example:

```
java -Dentirex.sdk.default.trace.propertiesfile ↵  
="D:/MyDirectory/entirex.trace.properties" MyClient
```

Using Trace Parameters of the Java Virtual Machine

▶ To switch on tracing mode by specifying the trace parameters of the Java virtual machine

- Submit the trace parameters when you start the Java virtual machine for the application to be traced. See [Trace Parameters](#). Note that parameter specifications submitted overwrite settings in the property file.

Disabling Tracing

▶ To switch off tracing

- Delete or rename the trace property file if it is located in the working directory or in the user's home directory.

Or:

Specify `level=NONE` when invoking the Java virtual machine :

```
java -Dentirex.sdk.default.trace.level = NONE MyClient
```

Configuring a Trace File for the XML/SOAP Listener

We recommend to add the following parameter in file `conf/axis2.xml` located in the Software AG Common Web Services Stack installation:

```
<parameter name="exx-trace-propertiesfile">file:///path of trace.properties ↵
file</parameter>
```

Example:

```
<parameter ↵
name="exx-trace-propertiesfile">file:///D:/MyDir/entirex.trace.properties</parameter>
```



Notes:

1. If a relative path is specified, the file is located in directory `WEB-INF/conf/` in the Web Services Stack web application file that contains the property.
2. In the parameter section of the file `axis2.xml`, the value of the parameter `exx-trace-propertiesfile` can contain definitions of operating system variables, for example `location="$EXXDIR/config/entirex.trace.properties"`.

Configuring a Trace File for the XML/SOAP Wrapper or the XML/SOAP RPC Server

See [Enabling Tracing](#).



Note: If the XML/SOAP RPC Server is running as a service, enable tracing by adding a Java system property to the start script or by copying file `entirex.trace.properties` to the same directory as the start script.

Trace Parameters

The following table provides an overview on trace parameters, their respective values, and how to submit them as arguments when invoking the Java virtual machine for the component to be traced.

Parameter	Syntax	Description															
propertiesfile	<code>entirex.sdk.component name.trace.propertiesfile= absolute or relative path including the properties file</code>	Provide the location of the <i>entirex.trace.properties</i> file. Only used when the component is started. Note: A sample trace property file named <i>entirex.trace.standard</i> with predefined trace settings is contained in the directory <i>../EntireX/config</i> . This file is a model and must be renamed to the valid name when used.															
level	<code>entirex.sdk.component name.trace.level = <i>tracelevel</i></code>	You can specify the following trace levels: <table border="1"> <thead> <tr> <th>Keyword</th> <th>Level</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>NONE</td> <td>No tracing</td> <td>Tracing is switch off</td> </tr> <tr> <td>STANDARD</td> <td>User</td> <td>Trace invocation of a component.</td> </tr> <tr> <td>ADVANCED</td> <td>Expert</td> <td>For support and diagnostics. Expert knowledge of the component is required.</td> </tr> <tr> <td>SUPPORT</td> <td>Expert</td> <td>Full trace output. Otherwise, as above.</td> </tr> </tbody> </table>	Keyword	Level	Description	NONE	No tracing	Tracing is switch off	STANDARD	User	Trace invocation of a component.	ADVANCED	Expert	For support and diagnostics. Expert knowledge of the component is required.	SUPPORT	Expert	Full trace output. Otherwise, as above.
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ADVANCED	Expert	For support and diagnostics. Expert knowledge of the component is required.															
SUPPORT	Expert	Full trace output. Otherwise, as above.															
directory	<code>entirex.sdk.component name.trace.directory = <i>absolute or relative path</i></code>	Default is the working directory.															
filename	<code>entirex.sdk.component name.trace.filename = <i>FILE STDOUT STDERR</i></code>	Specify where tracing data is written to: <table border="1"> <thead> <tr> <th>Keyword</th> <th>Destination</th> </tr> </thead> <tbody> <tr> <td>STDOUT (Default)</td> <td>Console</td> </tr> <tr> <td>STDERR</td> <td>Console</td> </tr> <tr> <td>FILE</td> <td>File name is generated internally: <i>exx.sdk.component name.threadName. backupNo.log</i>, where <i>backupNo</i> is in the range from ".000" to ".009". Note that the number of files created depends on <i>maximumsize</i>. If more than 10 files are required, the oldest backup file is overwritten.</td> </tr> </tbody> </table>	Keyword	Destination	STDOUT (Default)	Console	STDERR	Console	FILE	File name is generated internally: <i>exx.sdk.component name.threadName. backupNo.log</i> , where <i>backupNo</i> is in the range from ".000" to ".009". Note that the number of files created depends on <i>maximumsize</i> . If more than 10 files are required, the oldest backup file is overwritten.							
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Parameter	Syntax	Description
threadoriented	entirex.sdk.component name.trace.threadoriented = true false	<p>Keyword Description</p> <p>YES Thread-oriented: trace data is distributed over multiple files (one file per thread)</p> <p>NO (Default) Trace data is written to one file.</p>
rowlength	entirex.sdk.component name.trace.rowlength = maximum_characters_per_row	Maximum number of characters per row. If this limit is exceeded, the remaining letters are written to a new line.
maximumsize	entirex.sdk.component name.trace.maximumsize = max_file_size	Maximum size of the log file. If this limit is exceeded, the log file is renamed and the remaining data is written to a new log file, see <i>filename</i> . Note that this specification has an effect only if <i>filename</i> is set to "FILE".
timeframe	entirex.sdk.component name.trace.timeframe = <i>number</i> of day	<p>Time period after which the log file is closed. If this time limit has exceeded, the log file is renamed and the remaining data (if any) is written to a new log file. Note that this specification has an effect only if <i>filename</i> is set to "FILE". You can specify the following timeframes:</p> <p>Keyword Description</p> <p>1-9+H Number of hours</p> <p>1-9+D Number of days</p> <p>If no time frame is defined, only one log file is used until tracing is stopped.</p> <p>Example: If timeframe has been set to 30D, the current log file is closed and renamed at midnight every thirty days, and tracing is continued with a new log file.</p>

Component Names

Trace properties given in the trace property file might have to be restricted by *componentname*. The following components are available:

EntireX Component	componentname	Description
	default	The trace property is not restricted to a specific EntireX component.
XML/SOAP Runtime	xml.runtime	The trace property belongs to the EntireX XML/SOAP Runtime only.

Tracing the EntireX RPC-ACI Bridge

▶ To trace Broker calls

- 1 Use the system property `entirex.trace=[0|1|2|3]`.

This trace does not separate the calls to the Broker for RPC from those to the Broker for ACI. The trace levels are:

- 0 to switch off tracing.
- 1 to trace Broker calls.
- 2 to trace Broker calls and the payload.
- 3 to trace Broker calls and all buffers including the payload.

- 2 Redirect the trace to a file with the property `entirex.server.logfile`. Set this to the file name of the log file.

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EntireX Trace Utility

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Introduction to the EntireX Trace Utility

Broker traces, as well as traces produced from applications communicating with the Broker (so-called "stub traces"), contain a lot of details of the particular Broker calls. However, their layout is different and not easy to understand. The EntireX Trace Utility reads these Broker kernel as well as stub traces and produces a file with a common layout, where one line corresponds to a Broker call. The file layout is a standard CSV file (comma-separated values).

The request (Broker call sent from the stub to the kernel) and the corresponding reply (response sent back from the kernel to the stub) are merged together and presented as one logical Broker call in one row of the output file. Line numbers in the trace file and times for the request and reply are provided. It is also possible to specify filters so only the specified subset of the Broker calls are extracted. Since the Broker trace file contains all activities from both clients and servers and since it is possible to filter the calls, an end-to-end analysis of a conversation is simple to analyze.

The EntireX Trace Utility is divided into two separate elements: Process Trace and Show Trace.

Process Trace

Process Trace is used to process the information contained in the Broker trace file, saving the requested output to a simple text file.

- [Using the Tool](#)
- [Output Field Options](#)
- [Error Messages](#)

Using the Tool

▶ To open the EntireX Trace Utility under Windows

- 1 Choose "Trace Utility" in your EntireX program group.
or
- 2 Enter command

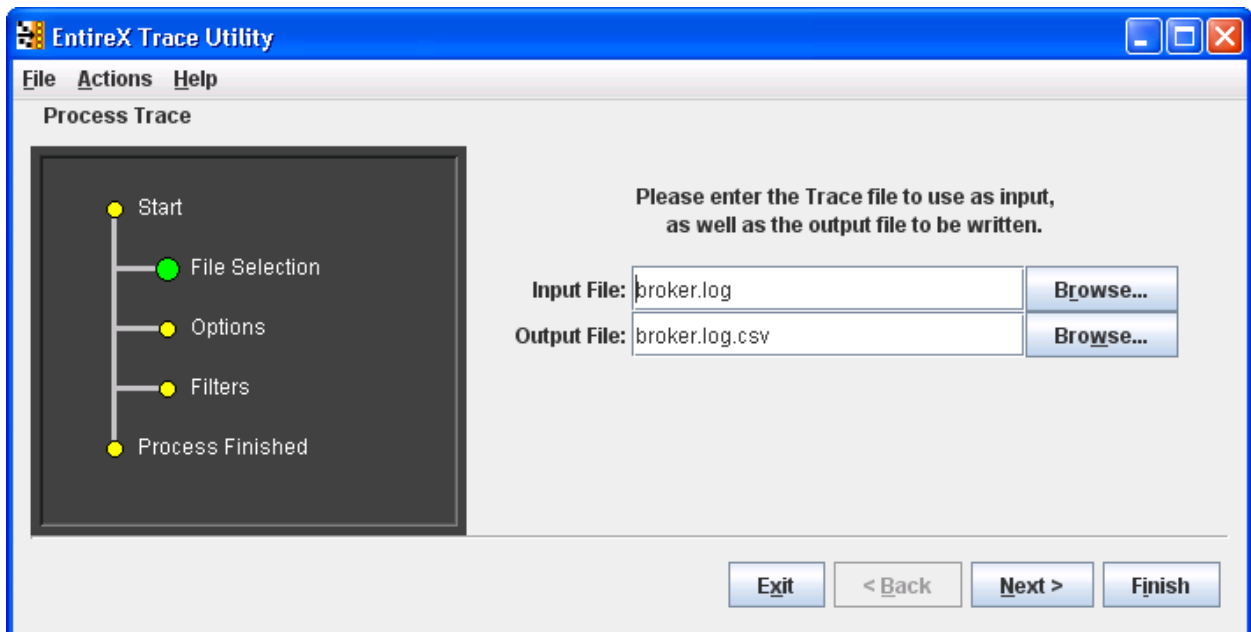
<drive>:\SoftwareAG\EntireX\bin\exxtraceutil.exe

▶ **To process the trace information**

- Follow the instructions on the following screens.

File Selection

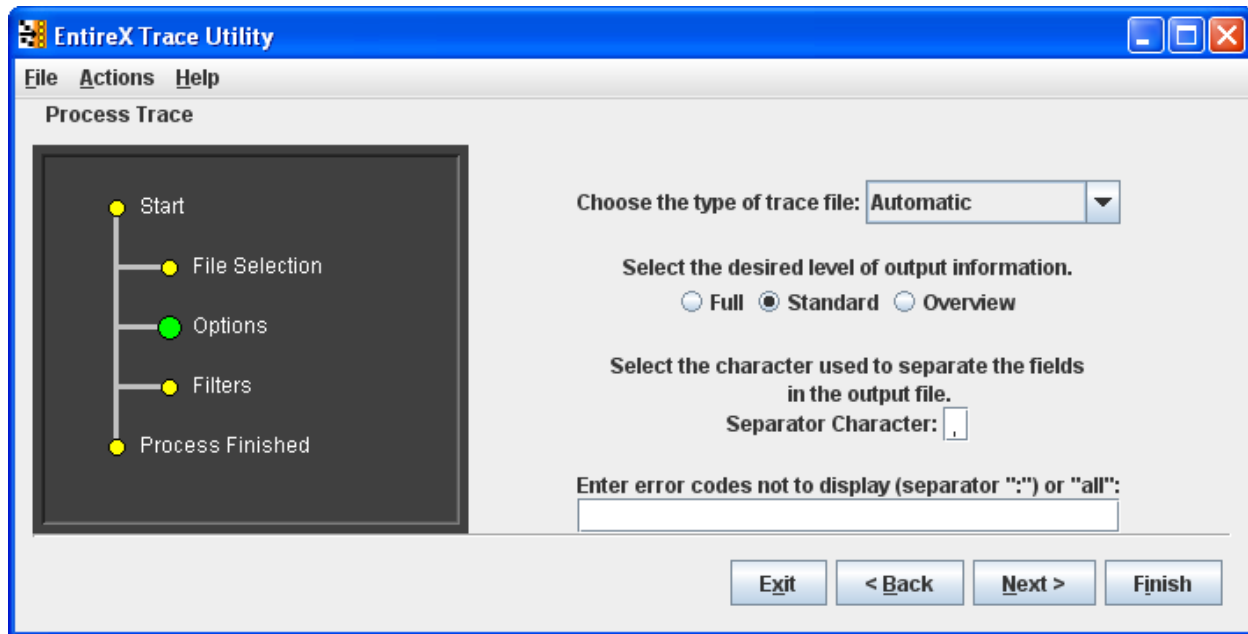
The following window is displayed.



The dark gray display section - the wizard window - shows you which step is required. File Selection has a large green dot, so the input and output files are required.

Options

In the display section Options is green.



See [Output Field Options](#) for information on Full, Standard and Overview.

See [Options](#) under [Using the EntireX Trace Utility in Batch Mode](#) for information on type of trace file and error codes not to display.

The defaults of Process Trace are:

- use automatic detection of trace file type
- return the standard amount of output
- save the output fields separated with commas (as this format is needed to be able to view the output in Show Trace)
- display all errors found in the trace file.

The default separator character is ",", you can change this character.

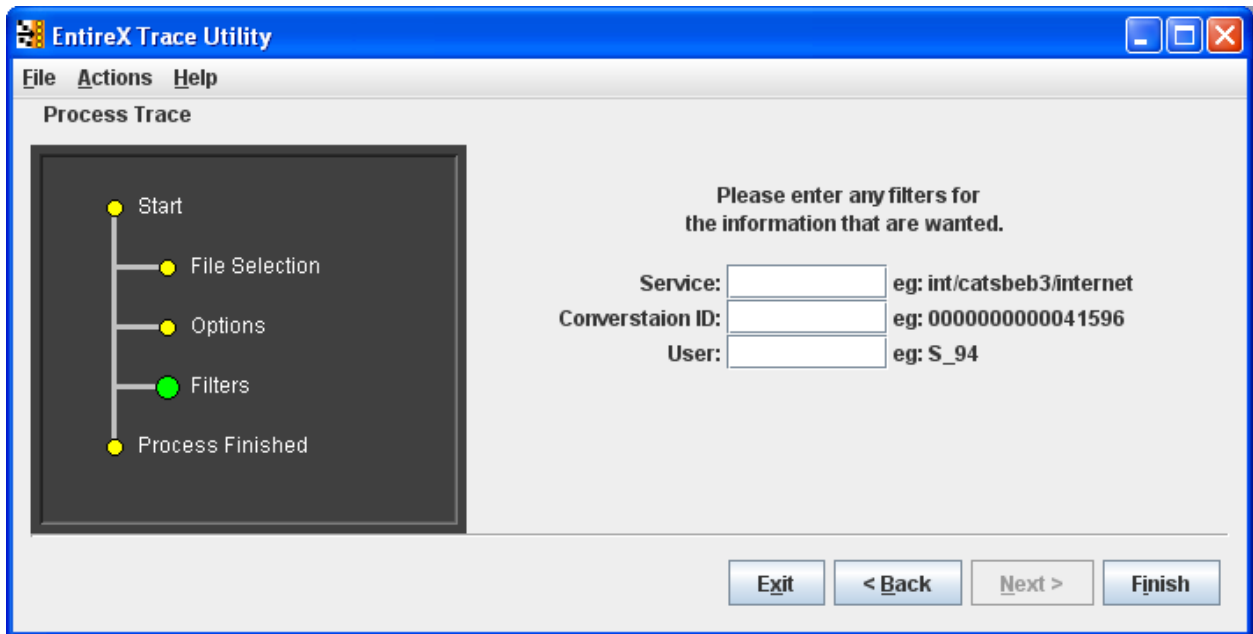
Filters

For the Standard and Full output options you can set filters to reduce the amount of information written to the output file, to create a more focused collection of information.

You can set filters for the Conversation ID (for example: 00000000041596), the Broker service (for example: int/catsbeb3/internet) and the User (for example: S_94).

The User filter does not correspond to the User ID or Physical User ID from the trace, but a generated value from Process Trace. This filter can only be used after already analyzing an output file and deciding which User to filter for.

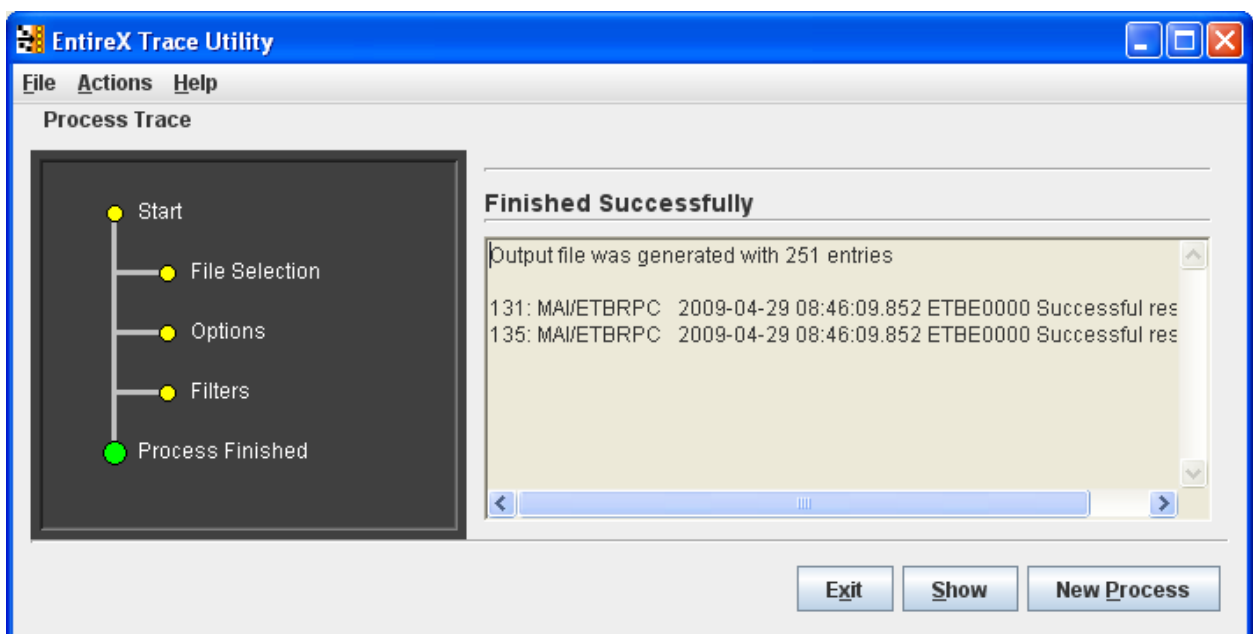
If more than one filter is specified only those entries which satisfy all conditions will be displayed.



► To generate the output file

- Choose Finish.

At this point any errors from processing the trace file are shown.



▶ **To display the results from the processing**

- Choose Show.

▶ **To leave the program**

- Choose Exit.

▶ **To process another trace file**

- Choose Process Trace from the menu bar.

A new processing wizard is started.

Output Field Options

You may select between three levels of output to be written to the output file:

Option	Output Fields
Overview	Phys Userid, Userid, Token, User, Service
Standard	Thread, Req, Reply, Phys Userid, Userid, Token, User, Function, Error, Service, Convid, Uowid, Uowstatus, Slen, Retl, Cuid
Full	Thread, Req, Reply, Phys Userid, Userid, Token, User, Function, Error, Service, Convid, Uowid, Uowstatus, Slen, Retl, Cuid, Time1, Time2, Api, Rlen, Cstat, Charset, SecurityToken, Security, TimeDiff, ReplyTime, Seqid, AppName, Node, Stub, Library, Program, Brokerid

Description of the columns in the CSV file (comma-separated values).



Note: Output which is the result of stub trace files does not contain entires for all columns.

Column	Explanation
Thread	The name of the Java thread executing the Broker call. Only available for trace files produces by the EntireX Java runtime.
Req	The line number in the trace file where the request part of the Broker call starts. 0 if the request cannot be found in the trace file.
Reply	The line number in the trace file where the reply part of the Broker call starts. 0 if the reply cannot be found in the trace file.
Phys.User ID	The physical user ID (Unique ID) which is displayed as a binary value in the Broker trace, nicely formatted. In case of a C stub trace file, the real physical user ID is not available; instead of this the thread ID is used to construct a replacement for the physical user ID.
User ID	The user ID of the Broker call.
Token	The token of the Broker call.

Column	Explanation
User	An artificial identifier for a user session (using physical user ID, user ID, and token). This is a unique number prefixed with either <i>C</i> - or <i>S</i> - . The latter will be used if the caller can be identified (using the available data in the trace) as a server application.
Function	The Broker function. If an option is specified it is appended to the function name. If a wait timeout is specified for the send or receive function it is appended.
Error	Error class, error number and error text. Error 0000 0000 is not displayed. The text "Successful response" is not displayed.
Service	The service address in the form class/server/service.
Convid	The conversation ID prefixed with *. If the conversation ID in the reply is different from the one in the request, the one from the reply is used.
Uowid	The unit of work ID prefixed with *. If the unit of work ID in the reply is different from the one in the request, the one from the reply is used.
Uowstatus	The unit of work status
Slen	The send length, i.e. the length of the data sent to the Broker.
Retl	The return length, i.e. the length of the data returned from the application.
Cuid	The client user ID (only for servers).
Time1	The time of the request entry in the trace file.
Time2	The time of the reply entry in the trace file.
Api	The API version.
Rlen	The (maximum) receive length specified in the send/receive call.
Cstat	The conversation status (only for servers).
Charset	The character used by the caller. Typical values are <i>ascii</i> , <i>ebcdic</i> <i>siemens</i> . If a value for the locale string has been specified, it is added using / as a separator.
SecurityToken	An interpretation of the security token of the request part. If the reply also contains a security token it is added using / as a separator. The interpretation of the prefixes is as follows:
	unknown The security token cannot be identified as a security token valid for EntireX Security
	enc The send/receive data is encrypted.
	pwd A password is specified in the call
	newpwd A new password is specified in the call.
	stub The security token has been built by an EntireX stub.
Security	server The security token has been processed by the Broker, the part which distinguishes security tokens is added.
	Some security-relevant control block fields of the call. If Forcelogon is enabled "fl:" is displayed. If encryption level has been specified either "broker" or "target" is displayed. If a password has been specified an artificial password is displayed. If in addition a new password has been specified, it is added using / as a separator. The artificial password is displayed as "pwd" followed by a number (starting with 0).
TimeDiff	The elapsed time between the request and the reply (Time2 - Time1).

Column	Explanation
ReplyTime	Server response time (difference in time between the server receiving a request and sending the reply).
Seqid	The internal sequence ID of the Broker call. Only available for Broker version 7.3 or higher.
AppName	Name of the application communicating with the Broker. Only available if API version 9 or greater is used.
Node	Node name of the application which is communicating with the Broker, e.g. the TCP/IP hostname. Only available if API version 9 or greater is used.
Stub	Stub name and version used by the application communicating with the Broker. Only available if API version 9 or greater is used.
Library	Library name if Broker call is an RPC call. Only available for RPC clients, or for server version 8.0 or higher.
Program	Program name if Broker call is an RPC call. Only available for RPC clients, or for server version 8.0 or higher.
Brokerid	The Broker ID of the Broker call.

Error Messages

The utility will only produce a meaningful result if the trace file is not corrupt. When transferring a trace from a mainframe, make sure all columns of the trace file are transferred, otherwise the utility might report errors (e.g. 2, 4 or 9). It is also possible that no errors are reported but the resulting CSV file has columns which contain invalid data.

Number	Message	Explanation
1	{0}	Text of a Java exception thrown at runtime.
2	Trace has incomplete entry for Binpart, expected length = {0}, actual length = {1}	Will be displayed a maximum of 5 times. Output for Security Token, Password, and New Password may be corrupted. Typical reason: columns in the trace file were lost when copying the trace from the mainframe.
3	Physical user ID {0} has wrong length	Trace file is corrupt.
4	Trace has incomplete entry for Key or Reply string	Will be displayed a maximum of 5 times. Output for any value may be corrupted. Typical reason: columns in the trace file were lost when copying the trace from the mainframe.
5	More then one request per user: {0}	This is an error condition similar to the Broker error 0037 0197.
6	does not include prefix	Trace file is corrupt.
7	does not include unique ID	Trace file is corrupt.
8	does not include reply or key	Trace file is corrupt.
9	Trace output might be incomplete and/or erroneous	Output for any value may be corrupt.
10	Problem with file {0}	Problem with trace or output file.

Number	Message	Explanation
11	Not enough memory to process trace, try increasing -Xmx or split trace	The Java runtime does not have enough memory to process the trace file. Increase the memory or delete unnecessary sections in the trace file.
12	SeqID "{0}" does not match "{1}"	The sequence ID of the request and the reply do not match. This may happen if the trace file is incomplete or corrupted. Otherwise contact Software AG support and provide the trace file.
13	Found: {0}	The text of a Broker error message found in the trace file is displayed. All non-zero return codes and the result of KERNELVERSION calls are displayed. This can be configured using a tool parameter.

Show Trace

Show Trace enables you to display the values of a CSV file in a table (CSV=comma-separated values).

The first row of the file is used as the headers for the file.

Sorting the Information

The information in the tables can be sorted by descending or ascending order. The sorting is done alphabetically, not numerically.

▶ To sort the information in a column by ascending order

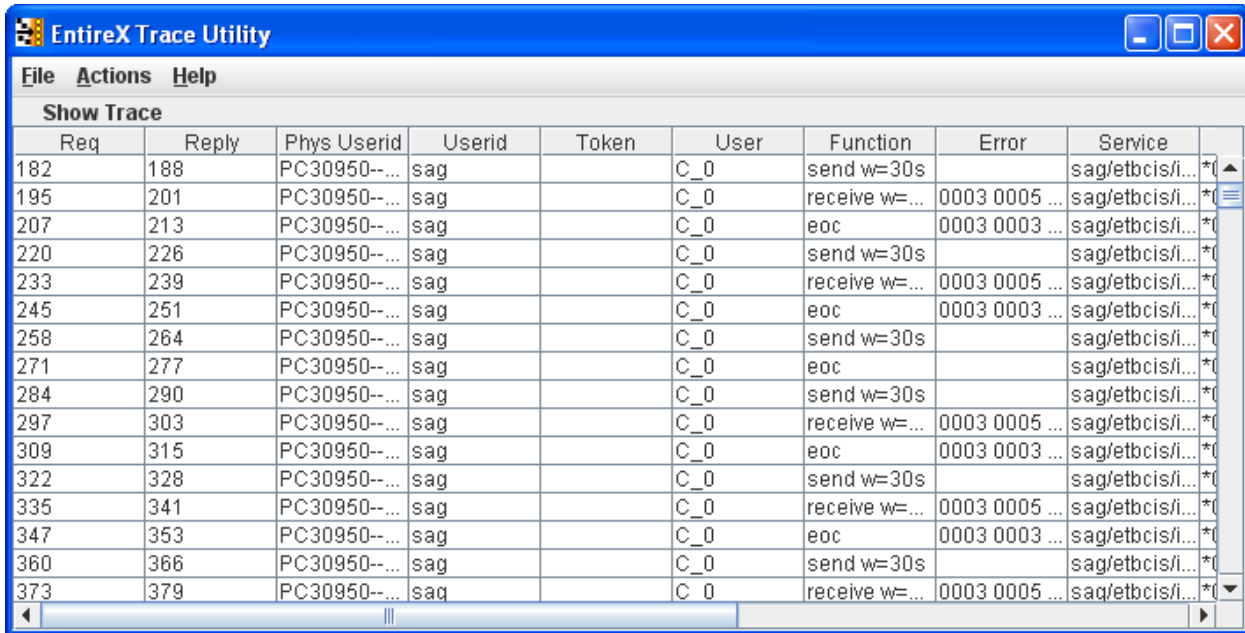
- Click on the header of the column.

▶ To sort the information in a column by descending order

- Use SHIFT and click on the header of the column.

Loading and Saving a CSV File

You can load and save a CSV file using the options located in the File menu.



The screenshot shows the 'EntireX Trace Utility' application window. The title bar includes the application name and standard window controls. The menu bar contains 'File', 'Actions', and 'Help'. Below the menu bar is a 'Show Trace' button. The main area is a table with the following columns: Req, Reply, Phys Userid, Userid, Token, User, Function, Error, and Service. The table contains 16 rows of trace data, with the last row (Req 373) selected. The 'Service' column for all rows is 'sag/etbcis/i...'. The 'Error' column contains values like '0003 0005 ...' and '0003 0003 ...'.

Req	Reply	Phys Userid	Userid	Token	User	Function	Error	Service
182	188	PC30950--...	sag		C_0	send w=30s		sag/etbcis/i...
195	201	PC30950--...	sag		C_0	receive w=...	0003 0005 ...	sag/etbcis/i...
207	213	PC30950--...	sag		C_0	eoc	0003 0003 ...	sag/etbcis/i...
220	226	PC30950--...	sag		C_0	send w=30s		sag/etbcis/i...
233	239	PC30950--...	sag		C_0	receive w=...	0003 0005 ...	sag/etbcis/i...
245	251	PC30950--...	sag		C_0	eoc	0003 0003 ...	sag/etbcis/i...
258	264	PC30950--...	sag		C_0	send w=30s		sag/etbcis/i...
271	277	PC30950--...	sag		C_0	eoc		sag/etbcis/i...
284	290	PC30950--...	sag		C_0	send w=30s		sag/etbcis/i...
297	303	PC30950--...	sag		C_0	receive w=...	0003 0005 ...	sag/etbcis/i...
309	315	PC30950--...	sag		C_0	eoc	0003 0003 ...	sag/etbcis/i...
322	328	PC30950--...	sag		C_0	send w=30s		sag/etbcis/i...
335	341	PC30950--...	sag		C_0	receive w=...	0003 0005 ...	sag/etbcis/i...
347	353	PC30950--...	sag		C_0	eoc	0003 0003 ...	sag/etbcis/i...
360	366	PC30950--...	sag		C_0	send w=30s		sag/etbcis/i...
373	379	PC30950--...	sag		C_0	receive w=...	0003 0005 ...	sag/etbcis/i...

Using the EntireX Trace Utility in Batch Mode

The EntireX Trace Utility is a graphical tool to process and display trace information. It can also be used as a command-line tool to process trace information.

► To use the EntireX Trace Utility in batch mode

- Enter the following command in the command line:

```
java -jar exxutil.jar [-option] filename [
  output file
]
```

or


```
java -Xms64m -Xmx256m -jar exxutil.jar [-option] filename [
output file
]
```

This specifies an initial and maximum memory allocation pool for the Java runtime (with Java 1.3 the defaults are 2 MB and 64 MB).

The *exxutil.jar* file is located in the classes subdirectory of the EntireX installation. *filename* is the name of the trace file. The output will be written to the file specified with the parameter *output file* or, if no name is specified there, output will be written to the file *filename.csv*.

Options

Option	Description										
-version	to display the version information										
-short	to generate an overview										
-long	to generate the full output										
-sep <i>char</i>	the separator character used in the resulting CSV file, default is ","										
-type <i>type</i>	By default the EntireX Trace Utility tries to infer the type of the trace file from the contents. If this is not possible (output shows "Processed 0 Broker calls") the type can be explicitly specified as follows: <table border="1" data-bbox="446 1066 1474 1339"> <tbody> <tr> <td>java</td> <td>The trace has been written by the EntireX Java runtime.</td> </tr> <tr> <td>cstub</td> <td>The trace has been written by the C-based Broker stub.</td> </tr> <tr> <td>dotnet</td> <td>The trace has been written by the .NET ACI stub.</td> </tr> <tr> <td>broker</td> <td>The trace has been written by the Broker kernel.</td> </tr> <tr> <td>directrpc</td> <td>The trace has been written by the Direct RPC component of webMethods EntireX Adapter.</td> </tr> </tbody> </table>	java	The trace has been written by the EntireX Java runtime.	cstub	The trace has been written by the C-based Broker stub.	dotnet	The trace has been written by the .NET ACI stub.	broker	The trace has been written by the Broker kernel.	directrpc	The trace has been written by the Direct RPC component of webMethods EntireX Adapter.
java	The trace has been written by the EntireX Java runtime.										
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broker	The trace has been written by the Broker kernel.										
directrpc	The trace has been written by the Direct RPC component of webMethods EntireX Adapter.										
-noshow <i>param</i>	The utility displays all Broker errors found in the trace. To prevent this either all errors or a set of specified errors can be excluded from the display. To prevent the display of all errors specify "all" as parameter. To prevent the display of specific errors specify the 8 digit error class and number. Multiple errors can be specified separated by ":". Examples: -noshow 00020002:00070007 or -noshow "0074 0074".										

For the default and long display, filters can be specified:

Option	Description
-user < <i>user</i> >	to get entries for a particular user
-conversation < <i>convid</i> >	for a particular conversation ID
-service	for a particular service

If more than one filter is specified, only those entries which satisfy all conditions will be displayed.

Example

```
java -jar exxutil.jar -long -sep ";" trace.txt
```

will generate all columns in a file trace.txt using ";" as separator character, the result will be in the file trace.txt.csv.

Usage Tips

Invalid or Incomplete Data in the Resulting CSV File

The utility will only produce a meaningful result if the trace file is not corrupt. When transferring a trace from a mainframe, make sure that all columns of the trace file are transferred. Otherwise the utility might report errors, e.g. error 2, 4 or 9. It may also happen that no errors are reported but the resulting CSV file has columns which contain invalid data.

Open the CSV File in Microsoft Excel

The CSV file can usually be opened in Microsoft Excel by double-clicking on the file name in the Windows Explorer. If the data is not displayed correctly, the separator character used by the utility (default is ";") does not match the list separator character used by Windows. Use the `-sep` option to specify a different separator character. To check the list separator used by Windows, go to **Control Panel > Regional Options > Numbers**.

Alternatively you may use the import functionality of Microsoft Excel. Open a spreadsheet, use **Data > Get External Data > Import Text File**. After selecting the file name (change default file type *.txt) the Text Import Wizard starts, which allows you to specify the delimiter (separator) character.

Displaying and Analyzing the CSV File in Microsoft Excel

The following are some tips how to use Microsoft Excel as a tool for displaying and analyzing the CSV file. They refer to Microsoft Excel 2000.

Formatting the spreadsheet: use CTRL A to select all data, change the font size e.g. to 8, then use **Format > Column > AutoFit Selection** to format all columns. Make the first line a "header line": select the 2nd line, use **Window > Freeze Panes**. Now, when scrolling through the entries the header line always stays on top.

Enable filtering: select the 1st line, use **Data > Filter > AutoFilter**. Now you have a drop-down box on each header entry that allows you to select a subset of the Broker calls.

Sorting Order

You can sort the entries in the generated CSV file using the Reply column. Thus the ordering corresponds to the time when the Broker kernel sends back the reply for the Broker call. Calls where no reply can be found in the trace appear at the end. If you use the Request column as the sorting criteria, the Broker calls will be ordered corresponding to the time when the Broker call arrives at the Broker kernel.

31 Broker Shutdown Statistics

- Shutdown Statistics Output 372
- Table of Shutdown Statistics 372

Shutdown Statistics Output

After a successful Broker execution, shutdown statistics and related information are produced. This output is written in the following sequence:

1. The diagnostic message ETBD0444 is written into the Broker trace log.
2. The output - i.e. statistics, internals and user-specified parameters - is written into the end of the Broker trace log file at shutdown.

Table of Shutdown Statistics

See [Legend](#) below for explanation of output type.

Output Type	Display Field	Description
U	Broker ID	Identifies the Broker kernel to which the attribute file applies. See <code>BROKER-ID</code> .
I	Version	The version of the Broker kernel currently running.
I	Generated platform family	The platform family for which this Broker kernel was built.
I	Runtime platform	The platform on which this Broker kernel is currently running.
I	Start time	The date and time when this Broker kernel started.
S	Restart count	The restart count indicates how many times the Broker kernel has been started with the persistent store. Therefore, after a cold start (<code>PSTORE=COLD</code>), the restart count will be 1. Then, after subsequent hot starts (<code>PSTORE=HOT</code>), the restart count will be 2 or greater.
U	Trace level	The value for the trace setting for this Broker kernel. See <code>TRACE-LEVEL</code> .
U	Worker tasks	The number of worker tasks for this Broker kernel. See <code>NUM-WORKER</code> .
U	<code>MAX-MEMORY</code>	The value of <code>MAX-MEMORY</code> or 0 if not defined. See <code>MAX-MEMORY</code> .
S	Memory allocated	Size of the allocated memory, in bytes.
S	Memory allocated HWM	Highest size of allocated memory in bytes since Broker started.
U	<code>NUM-SERVICE</code>	Value of <code>NUM-SERVICE</code> or 0 if not defined. See <code>NUM-SERVICE</code> .
S	Services active	The number of services currently active for this Broker kernel.
U	<code>NUM-CLIENT</code>	Value of <code>NUM-CLIENT</code> or 0 if not defined. See <code>NUM-CLIENT</code> .
S	Clients active	The number of clients currently active for this Broker kernel.
S	Clients active HWM	The high watermark for the number of clients active for this Broker kernel.

Output Type	Display Field	Description
U	NUM-SERVER	Value of NUM-SERVER or 0 if not defined. See NUM-SERVER.
S	Servers active	The number of servers currently active for this Broker kernel.
S	Servers active HWM	The high watermark for the number of servers active for this Broker kernel.
U	NUM-CONVERSATION	Value of NUM-CONVERSATION or 0 if not defined. See NUM-CONVERSATION.
S	Conversations active	The number of conversations currently active for this Broker kernel.
S	Conversations active HWM	The high watermark for the number of conversations active for this Broker kernel.
U	NUM-LONG-BUFFER	Value of NUM-LONG-BUFFER or 0 if not defined. See NUM-LONG-BUFFER.
S	Long buffers active	The number of long message buffers currently in use for this Broker kernel.
S	Long buffers active HWM	The high watermark for the number of long message buffers used for this Broker kernel.
U	NUM-SHORT-BUFFER	Value of NUM-SHORT-BUFFER or 0 if not defined. See NUM-SHORT-BUFFER.
S	Short buffers active	The number of short message buffers currently in use for this Broker kernel.
S	Short buffers active HWM	The high watermark for the number of short message buffers used for this Broker kernel.
U	NUM-TOPIC	Value of NUM-TOPIC or 0 if not defined. See NUM-TOPIC.
S	Topics active	The number of topics currently active for this Broker kernel.
U	NUM-PUBLISHER	Value of NUM-PUBLISHER or 0 if not defined.
S	Publishers active	The number of publishers currently active for this Broker kernel.
S	Publishers active HWM	The high watermark for the number of publishers active for this Broker kernel.
U	NUM-SUBSCRIBER	Value of NUM-SUBSCRIBER or 0 if not defined. See NUM-SUBSCRIBER.
S	Subscribers active	The number of subscribers currently active for this Broker kernel.
S	Subscribers active HWM	The high watermark for the number of subscribers active for this Broker kernel.
U	NUM-PUBLICATION	Value of NUM-PUBLICATION or 0 if not defined. See NUM-PUBLICATION.
S	Publications active	The number of publications currently active for this Broker kernel.
S	Publications active HWM	The high watermark for the number of publications active for this Broker kernel.

Output Type	Display Field	Description
U	Persistent store type	The type of persistent store used by this Broker kernel. See PSTORE-TYPE.
U	UOW persistence	Indicates whether units of work are persistent or not in this Broker kernel. See STORE.
U	Persistent store startup	Indicates the status of the persistent store at Broker startup. See PSTORE.
U	Persistent status lifetime	The multiplier to compute the lifetime of the persistent status. See UWSTATP.
U	Deferred UOWs allowed	Indicates whether or not deferred units of work are allowed. See DEFERRED.
U	Maximum allowed UOWs	The maximum number of units of work that can be active concurrently for this Broker kernel. See MAX-UOWS.
U	Maximum messages per UOW	The maximum number of messages allowed in a unit of work. See MAX-MESSAGES-IN-UOW.
U	UOW lifetime in seconds	Indicates the default lifetime for a unit of work. See UWTIME.
U	Maximum message length	Indicates the maximum message size that can be sent. See MAX-UOW-MESSAGE-LENGTH.
U	New UOW messages allowed	Indicates whether or not new units of work are allowed in this Broker kernel. See NEW-UOW-MESSAGES.
S	UOWs active	The number of units of work currently active in this Broker kernel.
S	Current UOW	The number of the last unit of work in this Broker kernel.
U	Accounting	Indicates the status of accounting records in this Broker kernel. See ACCOUNTING.
U	SSL port *	If applicable, the SSL port number on which this Broker kernel will listen for connection requests. See SSLPORT.
U	TCP port *	If applicable, the TCP port number on which this Broker kernel will listen for connection requests. See TCPPORT.
I	Number of function calls	Marks the beginning of the section of summary statistics for all the function calls.
S	DEREGISTER	The number of Broker DEREGISTER function calls since startup.
S	EOC	The number of Broker EOC function calls since startup.
S	KERNELVERS	The number of Broker KERNELVERS function calls since startup.
S	LOGOFF	The number of Broker LOGOFF function calls since startup.
S	LOGON	The number of Broker LOGON function calls since startup.
S	RECEIVE	The number of Broker RECEIVE function calls since startup.
S	REGISTER	The number of Broker REGISTER function calls since startup.
S	SEND	The number of Broker SEND function calls since startup.
S	SYNCPPOINT	The number of Broker SYNCPPOINT function calls since startup.

Output Type	Display Field	Description
S	UNDO	The number of Broker UNDO function calls since startup.
S	CONTROL_PUBLICATION	The number of Broker CONTROL_PUBLICATION function calls since startup.
S	RECEIVE_PUBLICATION	The number of Broker RECEIVE_PUBLICATION function calls since startup.
S	SEND_PUBLICATION	The number of Broker SEND_PUBLICATION function calls since startup.
S	SUBSCRIBE	The number of Broker SUBSCRIBE function calls since startup.
S	UNSUBSCRIBE	The number of Broker UNSUBSCRIBE function calls since startup.
S	REPLY_ERROR	The number of Broker REPLY_ERROR function calls since startup.
I	Worker task statistics	Marks the beginning of the section of summary statistics for all the worker tasks.
I	Worker number	The identifier of the worker task.
I	Status	The status of the worker task at shutdown.
S	# of calls	The number of Broker calls handled by the worker task since startup.
S	Idle time in seconds	The number of seconds the worker task has been idle since startup.

* Does not apply to z/OS.

Legend

Output Type	Description	Value	Origin of Value
I	Internal Information	Static	Determined by Software AG EntireX.
S	Shutdown Statistic	Variable	Determined by Broker activity during execution.
U	User-Specified Parameter	Variable	Specified by Broker administrator before or, if allowable, during execution.

32 Command Logging in EntireX

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- Command Log Filtering using System Management Hub 379
- ACI-driven Command Logging 382
- Dual Command Log Files 383

Command logging is a feature to assist in debugging Broker ACI applications. A command in this context represents one user request sent to the Broker and the related response of Broker.

Command logging is a feature that writes the user requests and responses to file in a way it is already known with Broker trace and `TRACE-LEVEL=1`. But command logging works completely independent from trace, and data is written to a file only if defined command trace filters detect a match.

Broker stub applications send commands or requests to the Broker kernel, and the Broker kernel returns a response to the requesting application. Developers who need to resolve problems in an application need access to those request and response strings inside the Broker kernel. That's where command logging comes in. With command logging, request and response strings from or to an application are written to a file that is separate from the Broker trace file.

Introduction to Command Logging

This section provides an introduction to command logging in EntireX and offers examples of how command logging is implemented. It covers the following topics:

- [Overview](#)
- [Command Log Files](#)
- [Defining Filters](#)
- [Programmatically Turning on Command Logging](#)

Overview

Command logging is similar to a Broker trace that is generated when the Broker attribute `TRACE-LEVEL` is set to 1. Broker trace and command logging are independent of each other, and therefore the configuration of command logging is separate from Broker tracing.

The following Broker attributes are involved in command logging:

Attribute	Description
<code>CMDLOG</code>	Set this to "N" if command logging is not needed.
<code>CMDLOG-FILE-SIZE</code>	A numeric value indicating the maximum size of command log file in KB.
<code>NUM-CMDLOG-FILTER</code>	The maximum number of filters that can be set.

In addition to `CMDLOG=YES`, the Broker needs the assignment of the dual command logging files during startup. If these assignments are missing, Broker will set `CMDLOG=NO`. See also *Broker Attributes* in the platform-independent administration documentation.

Command Log Files

The Broker keeps a record of commands (request and response strings) in a command log file.

At Broker startup, you will need to supply two command log file names and paths. Only one file is open at a time, however, and the Broker writes commands (requests and responses) to this file.

Under UNIX and Windows, the startup options `-y` and `-z` are evaluated by executable `etbnuc`. These options are used to specify the command log file names. Startup script/service assign these files by default.

When the size of the active command log file reaches the KB limit set by `CMDLOG-FILE-SIZE`, the file is closed and the second file is opened and becomes active. When the second file also reaches the KB limit set by `CMDLOG-FILE-SIZE`, the first file is opened and second file is closed. Existing log data in a newly opened file will be lost.

Defining Filters

In command logging, a filter is used to store and identify a class, server, or service, as well as a topic name and user ID.

Use the System Management Hub to define a filter. . During processing, the Broker evaluates the class, server, service, topic, and user ID associated with each incoming request and compares them with the same parameters specified in the filters. If there is a match, the request string and response string of the request is printed out to the command log file.

Programmatically Turning on Command Logging

Applications using ACI version 9 or above have access to the new field `LOG-COMMAND` in the ACI control block.

If this field is set, the accompanying request and the Broker's response to this request is logged to the command log file.



Note: Programmatic command logging ignores any filters set in the kernel.

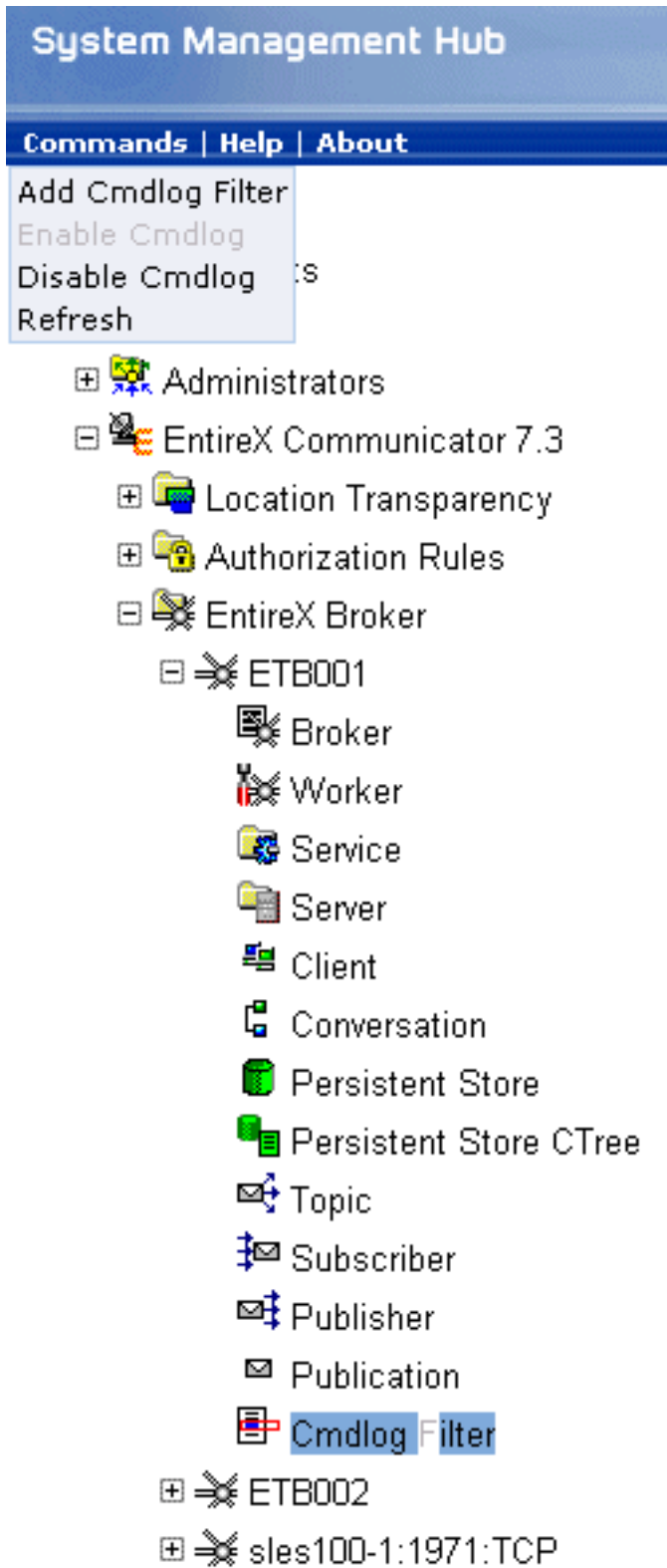
Command Log Filtering using System Management Hub

- [Setting up your Environment](#)
- [Adding a Filter](#)

- [Managing Filters](#)

Setting up your Environment

In order to process filters using System Management Hub, Broker attribute `CMDLOG` must be set to "YES" and the log files must be defined. See [Command Log Files](#) above. If this is the case, the **CmdlogFilter** node will be visible in the SMH tree.



Adding a Filter

▶ To add a filter

- 1 In the SMH tree view, select the **CmdlogFilter** node and, with the context menu, choose **Add Cmdlog Filter**.
- 2 In the **Add Cmdlog Filter** screen, add values for User ID, Class/Server/Service or Topic. Confirm with **OK**.

Managing Filters


The following **Cmdlog Filter** screen shows four filters. Use this screen to

- delete a filter
- disable a filter
- enable a disabled filter

Cmdlog Filter (Global Cmdlog currently enabled)

Delete Button ⇅	Enable/Disable Button ⇅	User ID ⇅	Class/Server/Service ⇅	Topic ⇅	Enabled ⇅
Delete	Disable	USER_1	SAG/ETBCIS/SAGCCV5		Y
Delete	Disable	USER_1	SAG/ETBCIS/SAGCIV5		Y
Delete	Enable	USER_1	RCP/SAGCCV5/CALLNAT		N
Delete	Disable	USER_1	RPC/SAGCIV5/CALLNAT		Y

Items 1 to 4 of 4

 **Note:** You cannot change the values for User ID, Class/Server/Service or Topic in the **Cmdlog Filter** screen. Instead, delete the command log filter and add a new one with the required values.

ACI-driven Command Logging

EntireX components that communicate with Broker can trigger command logging by setting the field `LOG-COMMAND` in the ACI control block.

When handling ACI functions with command log turned on, Broker will not evaluate any filters. Application developers must remember to reset the `LOG-COMMAND` field if subsequent requests are not required to be logged.

Dual Command Log Files

Broker's use of two command log files prevents any one command log file from becoming too large.

When starting a Broker with command log support, you must therefore specify two file names and paths - one for each of the two command log files. The sample startup script installed with the product uses the variables `ETB_CMDLOG1` and `ETB_CMDLOG2` as the default command log file names.

Under Windows, the keys `ETB_CMDLOG1` and `ETB_CMDLOG2` are entered in the Registry with values `CMDLOGR1` and `CMDLOGR2`.

At startup, Broker initializes both files and keeps one of them open. Command log statements are printed to the open file until the size of this file reaches the value specified in the Broker attribute `CMDLOG-FILE-SIZE`. This value must be specified in KB.

When the size of the open file exceeds the value specified in the Broker attribute `CMDLOG-FILE-SIZE`, Broker closes this file and opens the other, dormant file. Because the Broker closes a log file only when unable to print out a complete log line, the size of a *full* file may be smaller than `CMDLOG-FILE-SIZE`.

33

Accounting in EntireX Broker

- EntireX Accounting Data Fields 386
- Using Accounting under UNIX and Windows 389
- Example Uses of Accounting Data 390

This chapter describes the accounting records for Broker that can be used for several purposes, including:

- **application chargeback**
for apportioning EntireX resource consumption on the conversation and/or the application level;
- **performance measurement**
for analyzing application throughput (bytes, messages, etc.) to determine overall performance;
- **trend analysis**
for using data to determine periods of heavy and/or light resource and/or application usage.

EntireX Accounting Data Fields

In the EntireX Accounting record, there are various types of data available for consumption by applications that process the accounting data:

Field Name	Accounting Version	Type of Field	Description
Record Write Time	1	A14 Timestamp in "YYYYMMDDHHMMSS" format	The time this record was written to the accounting file in YYYYMMDDHHMMSS format.
EntireX Broker ID	1	A32	Broker ID from attribute file.
EntireX Version	1	A8	Version information, <i>v . r . s . p</i> where <i>v</i> =version <i>r</i> =release <i>s</i> =service pack <i>p</i> =patch level for example 9.6.0.00.
Platform of Operation	1	A32	Platform where EntireX is running.
EntireX Start Time	1	A14 Timestamp in "YYYYMMDDHHMMSS" format	Time EntireX was initialized in YYYYMMDDHHMMSS format.
Accounting Record Type	1	A1	It is always C for conversation. Future Types will have a different value in this field.
Client User ID	1	A32	USER-ID ACI field from the client in the conversation.
Client Token	1	A32	TOKEN field from the ACI from the client.

Field Name	Accounting Version	Type of Field	Description
Client Physical ID	1	A56	The physical user ID of the client, set by EntireX.
Client Communication Type	1	I1	Communication used by client: 1 = Net-Work 2 = TCP/IP 3 = APPC 4 = WebSphere MQ 5 = SSL
Client Requests Made	1	I4	Number of Requests made by client.
Client Sent Bytes	1	I4	Number of bytes sent by client.
Client Received Bytes	1	I4	Number of bytes received by client.
Client Sent Messages	1	I4	Number of messages sent by client.
Client Received Messages	1	I4	Number of messages received by client.
Client Sent UOWs	1	I4	Number of UOWs sent by client.
Client UOWs Received	1	I4	Number of UOWs received by client.
Client Completion Code	1	I4	Completion code client received when conversation ended.
Server User ID	1	A32	USER- ID ACI field from the server in the conversation.
Server Token	1	A32	TOKEN field from the ACI from the server.
Server Physical ID	1	A56	The physical user ID of the server, set by EntireX.
Server Communication Type	1	I1	Communication used by Server: 1 = Entire Net-Work 2 = TCP/IP 3 = APPC 4 = WebSphere MQ 5 = SSL
Server Requests Made	1	I4	Number of requests made by server.
Server Sent Bytes	1	I4	Number of bytes sent by server.
Server Received Bytes	1	I4	Number of bytes received by server.
Server Sent Messages	1	I4	Number of messages sent by server.
Server Received Messages	1	I4	Number of messages received by server.
Server Sent UOWs	1	I4	Number of UOWs sent by server.
Server Received UOWs	1	I4	Number of UOWs received by server.

Field Name	Accounting Version	Type of Field	Description
Server Completion Code	1	I4	Completion code server received when conversation ended.
Conversation ID	1	A16	CONV - ID from ACI.
Server Class	1	A32	SERVER-CLASS from ACI.
Server Name	1	A32	SERVER-NAME from ACI.
Service Name	1	A32	SERVICE from ACI.
CID=NONE Indicator	1	A1	Will be N if CONV - ID=NONE is indicated in application.
Restarted Indicator	1	A1	Will be R if a conversation was restarted after a Broker shutdown.
Conversation Start Time	1	A14 Timestamp in "YYYYMMDDHHMMSS" format	Time conversation began in YYYYMMDDHHMMSS format.
Conversation End Time	1	A14 Timestamp in "YYYYMMDDHHMMSS" format	Time conversation was cleaned up in YYYYMMDDHHMMSS format.
Conversation CPU Time	1	I4	Number of microseconds of CPU time used by the conversation
Client Security Identity	2	A32	Actual identity of client derived from authenticated user ID.
Client Application Node	2	A32	Node name of machine where client application executes.
Client Application Type	2	A8	Stub type used by client application.
Client Application Name	2	A64	Name of the executable that called the broker. Corresponds to the Broker Information Service field <i>APPLICATION-NAME</i> in the ACI Programming documentation.
Client Credentials Type	2	I1	Mechanism by which authentication is performed for client.
Server Security Identity	2	A32	Actual identity of server derived from authenticated user ID.
Server Application Node	2	A32	Node name of machine where server application executes.
Server Application Type	2	A8	Stub type used by server application.
Server Application Name	2	A64	Name of the executable that called the broker. Corresponds to the Broker Information Service field <i>APPLICATION-NAME</i> in the ACI Programming documentation.

Field Name	Accounting Version	Type of Field	Description
Server Credentials Type	2	I1	Mechanism by which authentication is performed for server.
Client RPC Library	3	A128	RPC library referenced by client when sending the only/first request message of the conversation.
Client RPC Program	3	A128	RPC Program referenced by client when sending the only/first request message of the conversation.
Server RPC Library	3	A128	RPC library referenced by server when sending the only/first response message of the conversation.
Server RPC Program	3	A128	RPC Program referenced by server when sending the only/first response message of the conversation.
Client IPv4 Address	4	A16	IPv4 address of the client.
Server IPv4 Address	4	A16	IPv4 address of the server.
Client Application Version	4	A16	Application version of the client.
Server Application Version	4	A16	Application version of the server.
Client IPv6 Address	5	A46	IPv6 address of the client.
Server IPv6 Address	5	A46	IPv6 address of the server.



Note: Accounting fields of any version greater than 1 are created only if the attribute `ACCOUNTING-VERSION` value is greater than or equal to the corresponding version. For example: accounting fields of version 2 are visible only if `ACCOUNTING-VERSION=2` or higher is specified.

Using Accounting under UNIX and Windows

- [Broker Attribute File Settings](#)

- [Retrieving Accounting Data](#)

Broker Attribute File Settings

ACCOUNTING = NO | YES | (YES, SEPARATOR=Separator Characters) (Default is NO)

Set this parameter to "NO" (i.e., do not create accounting data) or "YES" to create accounting data. Up to seven separator characters can be specified using the SEPARATOR suboption, for example ACCOUNTING=(YES, SEPARATOR=;). If no separator character is specified, the comma character will be used.

Retrieving Accounting Data

The accounting file will be located in the Broker's installed directory. The file's name is based on the ETB_LOG environment variable and the current date and time (for uniqueness). Example: If ETB_LOG is set to BROKER1.LOG, the accounting data file will be named BROKER1_YYYYMMDDH-HMMSS.csv. If ETB_LOG is not set, the Broker's ID will be used, with an extension of CSV (e.g. ETB048_YYYYMMDDHHMMSS.csv). See *Environment Variables in EntireX* in the general administration documentation.

Example Uses of Accounting Data

- [Chargeback](#)
- [Trend Analysis](#)
- [Tuning for Application Performance](#)

Chargeback

Customers can use the EntireX accounting data to perform chargeback calculations for resource utilization in a data center. Suppose EntireX Broker is being used to dispatch messages for three business departments: Accounts Receivable, Accounts Payable, and Inventory. At the end of each month, the customer needs to determine how much of the operation and maintenance cost of EntireX Broker should be assigned to these departments. For a typical month, assume the following is true:

Department	Amount of Data	Percentage	Messages Sent	Percentage	Average Percentage
Accts Payable	50 MB	25	4000	20	22.5
Accts Receivable	40 MB	20	6000	30	25
Inventory	110 MB	55	10000	50	52.5

The use of Broker resources here is based upon both the amount of traffic sent to the Broker (bytes) as well as how often the Broker is called (messages). The average of the two percentages is used

to internally bill the departments, so 52.5% of the cost of running EntireX Broker would be paid by the Inventory Department, 25% by the Accounts Receivable Department, and 22.5% by the Accounts Payable Department.

Trend Analysis

The Accounting Data can also be used for trend analysis. Suppose a customer has several point-of-sale systems in several stores throughout the United States that are tied into the corporate inventory database with EntireX. The stubs would be running at the stores, and the sales data would be transmitted to the Broker, which would hand it off to the appropriate departments in inventory. If these departments wish to ascertain when the stores are busiest, they can use the accounting data to monitor store transactions. Assume all of the stores are open every day from 9 AM to 10 PM.

Local Time	Average: Weekday Transactions per Store	Maximum Weekday Transactions in any Store	Average Weekend Transactions per Store	Maximum Weekend Transactions in any Store
9 AM	7.3	27	28.2	83
10 AM	11.2	31	29.3	102
11 AM	14.6	48	37.9	113
12 noon	56.2	106	34.8	98
1 PM	25.6	65	34.2	95
2 PM	17.2	52	38.5	102
3 PM	12.1	23	42.7	99
4 PM	18.3	34	43.2	88
5 PM	26.2	47	45.2	93
6 PM	38.2	87	40.6	105
7 PM	29.6	83	39.2	110
8 PM	18.6	78	28.6	85
9 PM	11.2	55	17.5	62

The owner of the stores can examine the data and make decisions based upon the data here. For example, on weekdays, he or she can see that there is little business until lunchtime, when the number of transactions increase. It then decreases during lunch hour; then there is another increase from 5 PM to 8 PM, after people leave work. Based on this data, the owner might investigate changing the store hours on weekdays to 10 AM to 9 PM. On the weekend the trends are different, and the store hours could be adjusted as well, although there is a more regular customer flow each hour on the weekends.

Tuning for Application Performance

Assume that a customer has two applications that perform basic request/response messaging for similar sized messages. The applications consist of many Windows PC clients and Natural RPC Servers on UNIX. An analysis of the accounting data shows the following:

Application Type	Class	Server	Service	Average Server Messages Received per Conversation	Average Client Messages Received per Conversation
Application 1:	CLASS1	SERVER1	SERVICE1	10.30	10.29
Application 2:	CLASS2	SERVER2	SERVICE2	10.30	8.98

A further analysis of the accounting data reveals that there are a lot of non-zero response codes in the records pertaining to Application 2, and that a lot of these non-zero responses indicate timeouts. With that information, the customer can address the problem by modifying the server code, or by adjusting the timeout parameters for SERVER2 so that it can have more time to get a response from the Service.