How To... Investigate Timeouts In Synchronous XI/PI Scenarios

Applicable Releases:

SAP NetWeaver Process Integration 7.0 & 7.1x
SAP NetWeaver Exchange Infrastructure 3.0

Topic Area:
SOA Middleware

Capability:
Service Bus

Version 1.0
July 2009
## Document History

<table>
<thead>
<tr>
<th>Document Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>First official release of this guide</td>
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</table>
## Typographic Conventions

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<thead>
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<th>Type Style</th>
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<tr>
<td>Example Text</td>
<td>Words or characters quoted from the screen. These include field names, screen titles, pushbuttons labels, menu names, menu paths, and menu options. Cross-references to other documentation</td>
</tr>
<tr>
<td>Example text</td>
<td>Emphasized words or phrases in body text, graphic titles, and table titles</td>
</tr>
<tr>
<td>Example text</td>
<td>File and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.</td>
</tr>
<tr>
<td>Example text</td>
<td>User entry texts. These are words or characters that you enter in the system exactly as they appear in the documentation.</td>
</tr>
<tr>
<td>&lt;Example text&gt;</td>
<td>Variable user entry. Angle brackets indicate that you replace these words and characters with appropriate entries to make entries in the system.</td>
</tr>
<tr>
<td>EXAMPLE TEXT</td>
<td>Keys on the keyboard, for example, F2 or ENTER.</td>
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## Icons

<table>
<thead>
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<tr>
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<td>Caution</td>
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<tr>
<td>📘</td>
<td>Note or Important</td>
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<td>📚</td>
<td>Example</td>
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<tr>
<td>🏷️</td>
<td>Recommendation or Tip</td>
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1. Background Information

In synchronous messaging scenarios running over PI, several communication segments are involved where each may lead to a time-out. Such a time-out on one communication segment causes the messaging scenario to fail as a whole.

This document highlights various timeouts that may occur during synchronous PI scenarios, and how an administrator can avoid them by configuring the relevant settings. As the concrete time-out periods depend on the scenario, this document does not provide concrete figures. It describes the solutions in a general way.

The picture below describes the complexity and possible timeout pitfalls of synchronous communication.
2. Basic documentation

Given below is a brief description on the message flow between various components and the timeouts that may occur.

The similar concept is used throughout the document.

Consider an example of a SOAP scenario:

Here SOAP request message gets posted into the *network* layer. This message is sent to the *Adapter framework* where the AAE converts the SOAP message into the XI message and posts it to the *Messaging System*.

*Messaging System* which resides on the Java stack persists the message in the *database* and then sends the message to the *Internet Communication Broker* for further transmission.

*ICM* ensures that the communication between the SAP System (SAP Web Application Server) and the outside world via HTTP, HTTPS and SMTP protocols works properly.

Here the timeout might occur due to long processing in IS or due to some delays in receiver application which are depicted by the *clock symbol*. This may lead to a timeout in *sender SOAP adapter* as shown by the *callout*.

**Note**

Considering the above example we will now focus on the different scenarios where the timeouts occur.
2.1 Timeout Calling the Integration Server from the Adapter Framework

2.1.1 ICM timeout for incoming HTTP calls (AF -> IS): ICM_HTTP_TIMEOUT

Potential cause for the error:

- Could be a large message size
- Processing taking long time on IE itself
- General system overload
Proposed Solution:
Set the timeout parameters in transaction *smicm*

- Goto transaction *smicm* -> services

**ICM Monitor**

![ICM Monitor Screenshot]

- Now check the various port values

**Service Display**

![Service Display Screenshot]
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ICM Monitor - Service Display

Active Services

<table>
<thead>
<tr>
<th>No.</th>
<th>Protocol</th>
<th>Service Name/Port</th>
<th>Host Name</th>
<th>Keep Alive</th>
<th>Proc Time</th>
<th>Act</th>
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<td></td>
</tr>
</tbody>
</table>

Value for all ports: icm/keep_alive_timeout (default: 60 seconds)
Value for specific ports: icm/server_port_0 = PROT=HTTP, PORT=<icmhttpport>, TIMEOUT=30, PROCTIMEOUT=900

If PROCTIMEOUT is not set -> TIMEOUT is used
If TIMEOUT is also not set -> icm/keep_alive_timeout is used
By Default: If PROCTIMEOUT and TIMEOUT are not set -> icm/keep_alive_timeout is used.

In a system where the default timeout settings of 30 seconds for the keepalive timeout and the processing timeout are not sufficient because of long-running applications, we recommend that you set the TIMEOUT and PROCTIMEOUT parameters for the relevant services so that you can configure them independently of each other. In addition, we recommend that you do not set the TIMEOUT value higher than necessary, for example, to the usual default value of 30 seconds.

We recommend, for example, the following settings:
icm/server_port_0 = PROT=HTTP,PORT=1080,TIMEOUT=30,PROCTIMEOUT=600
to allow a maximum processing time of 10 minutes

July 2009
2.1.2  Timeout due to insufficient available dialog work processes in Integration Server

Potential cause for the error:
Same as first one, but it results in timeout due to ABAP server being overloaded. This can happen in the high load situation.

When the message flow into the ABAP server from the Messaging System is high, the ABAP dialog processes might not be enough to process all the messages.

This may cause a delay in processing the messages. Such messages waiting to get processed might suffer HTTP timeout at ICM as call from AF to IS fails.

Proposed Solution:
Check whether the dialog work processes are properly configured for your hardware.
rdisp/wp_no_dia
Default: 2
2.2 Timeout Calling the Adapter Framework

2.2.1 ICM 402 timeout for http client calls (IS -> AF): ICM_HTTP_TIMEOUT

Potential cause for the error:
During high load situation or when the message is too large, Messaging System may not have enough threads to process the message. This might cause a delay in processing and hence wait time might exceed in ICM causing a HTTP timeout. Hence the wait time should be increased in ICM to prevent the timeout.

Proposed Solution:
In general solution is derived from ICM settings.

Value for all ports: icm/keep_alive_timeout (Default: 60 seconds)
Value for specific ports: icm/server_port_0 = PROT=HTTP, PORT=<icmhttpport>, TIMEOUT=30, PROCTIMEOUT=900

If PROCTIMEOUT is not set then TIMEOUT is used, else if TIMEOUT is not set then icm/keep_alive_timeout is used.

Default: TIMEOUT and PROCTIMEOUT not set -> icm/keep_alive_timeout is used.

In a system where the default timeout settings of 30 seconds for the keepalive timeout and the processing timeout are not sufficient because of long-running applications, we recommend that you set the TIMEOUT and PROCTIMEOUT parameters for the relevant services so that you can configure them independently of each other. In addition, we recommend that you do not set the TIMEOUT value higher than necessary, for example, to the usual default value of 30 seconds.
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We recommend, for example, the following settings:

```
icm/server_port_0 = PROT=HTTP, PORT=1080,TIMEOUT=30,PROCTIMEOUT=600
```

to allow a maximum processing time of 10 minutes.

⚠️ Note
Refer note 824554 - ICM Timeout Parameters for more details.

### 2.2.2 HTTP 401 – Authentication failure

**Potential cause for the error:**

Calling the AF may result in HTTP 401 during high load; this is caused by too few connections to the ABAP user management or a timeout waiting for a new connection.

In the standard J2EE installation the User Management Engine (UME) is configured to use the user database from ABAP-backend.

UME has a connection pool wrapper which takes connections from the JCo pool for the backend communication. During creation of a session within the J2EE engine this user is verified directly in the ABAP-database.

The connection pool for these verification calls to the ABAP-side is controlled with J2EE properties in the J2EE service 'UME Provider'. The problem here is that this connection pool gets exhausted - its default for max number of 10 connections gets reached, and there are no more connections for the other application threads.
Proposed Solution:

Check these parameters in NWA / VA:

`ume.r3.connection.master.poolmaxsize`

`ume.r3.connection.master.poolmaxwait`

Default Max. Connections: 20

Default Max. Wait Time: 10,000 ms

Increase parameters until problem disappears: for example,

*Max. Connections*= 50, *Max. Wait Time*= 60000

**Example**

Exception will look like this in default trace:

[EXCEPTION]

{0}#1#com.sap.security.core.persistence.datasource.PersistenceException: Connection pool com.sap.security.core.persistence.datasource.imp.R3JCo640Proxy_1151956586133_1 is exhausted. **The current pool size limit (max connections) is 10 connections.**

Current status of connection pool with ID com.sap.security.core.persistence.datasource.imp.R3JCo640Proxy_1151956586133_1:

- Created on Tue Jul 04 04:56:26 JST 2006
- Number of connections lent out by the application: 0
- Configured maximum number of connections: 10

There is a significant difference between configured and available number of connections. This might indicate an implementation defect in the Java Connector (engine component "com.sap.mw.jco").
2.2.3 HTTP 500 – HTTP_RESP_STATUS_CODE_NOT_OK

ICM gets timed out!

Potential cause for the error:

There could be several reasons for the same-

1. When an http servlet tries to read the request input stream, the following error is thrown or logged: com.sap.engine.services.httpserver.exceptions.HttpIOException: Read timeout. The client has disconnected or a synchronization error has occurred. Read `<read-bytes>` bytes. Expected `<expected-bytes>`, `<read-bytes>` and `<expected-bytes>` are actual values.

2. Low bandwidth and high latency clients do not receive the full response from http service or receive error http response - 500.

3. During high load some clients do not receive the full response from http service or receive error http response - 500.

4. ICM is setup to forward requests to the Engine and clients randomly fail with the mentioned in 1) "Read timeout" error.

Proposed Solution:

1. Increase the proctimeout in `smicm` as per note - 824554

2. Application threads in the J2EE engine might have got consumed in high load situations. Increase the count of application threads in config tool at location `Config Tool -> cluster-data -> <configuration template> -> <instance-ID> -> managers -> ApplicationThreadManager -> MaxThreadCount`
3. Increase the parameter `ServletInputStreamTimeout` from 180000 to 1728000000.

   **Steps for setting this parameter:**
   
   a. If you have configured ICM to forward requests to the J2EE dispatcher then apply Note 1048692. If the problem is not resolved, then apply section b.
   
   b. The request bytes are reaching the Engine too slowly
      
      i. Start the configtool in `<J2EE>/configtool` directory
      
      ii. Browse the tree in the left pane
           
             `cluster-data -> Global server configuration -> services -> http`
           
      iii. Press the `ServletInputStreamTimeout` key in the keylist on the right
            
      iv. Change the value of the "Value" field at the bottom of the right pane to the preferred one (in milliseconds).
           
           -1 means there is no timeout - that is unless the full request comes into a single chunk, an error will be thrown
           
           180000 means the Engine would wait for 3 minutes for any byte to be entered in the stream.
           
           1728000000 means the Engine would wait for 20 days for any byte to be entered in the stream
            
      v. Press the "Set" button in the top-right corner
      
      vi. Select from the menu File -> Apply and confirm all popups.
      
      vii. Restart the Engine for changes to take effect

**Note**

Refer to note 807000 for more details on parameter `ServletInputStreamTimeout`

**Example 1**

Error as it appears in sxmb_moni:

```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
<! Call Adapter >
  <SAP:Category>XIServer</SAP:Category>
  <SAP:Code area="INTERNAL">HTTP_RESP_STATUS_CODE_NOT_OK</SAP:Code>
  <SAP:P1>500</SAP:P1>
  <SAP:P2>Timeout</SAP:P2> ..... 
  <SAP:AdditionalText><H2>500 Connection timed out</H2>....</SAP:AdditionalText>
  <SAP:Stack>HTTP response contains status code 500 with the description Timeout Error when sending by HTTP (error code: 500, error text: Timeout)</SAP:Stack>
</SAP:Error>
```
Example 2

XI synchronous scenario RFC <-> XI <-> JDBC is failing (RFC sender adapter) intermittently with the following error:

>Error in processing caused by:
com.sap.aii.af.mp.module.ModuleException: call to messaging system

failed: com.sap.aii.af.ra.ms.api.DeliveryException: Received HTTP response code 500: Timeout caused by: com.sap.aii.af.ra.ms.api.DeliveryException: Received HTTP response code 500: Timeout #

2.2.4 HTTP Response Code 503: Service Unavailable

Potential cause for the error:

The Integration Server or a backend system sends messages to the XI Adapter Framework (XI, Marketplace, BC, RNIF or CIDX protocol)This happens by calling the 'Receive' servlet of the messaging system: http://<hostname>:<port>/MessagingSystem/receive/<connection>/<protocol>. This operation fails, the server replies with "HTTP Response Code 503: Service Unavailable". The message receives the status "System Error" after all of the retries is run in the Message Display Tool (MDT).

This could also be due to DB being busy while processing other messages.
**Example**

In the details of the message (error header), you find an entry of the form: "http://server:50000/MessagingSystem/receive/AFW/XI using connection AFWfailed, due to: Received HTTP response code 503: The requested application, AFW, is currently unavailable".

**Proposed Solution:**

- Make sure that the J2EE server is accessible. Check the access to the Receive Servlet as described above.

- In the Visual Administrator/NWA, navigate to the "SAP XI AF Messaging" service and increase the value of the "pollAttempts" parameter to 100 in the "messaging.connections" property. Do this for all affected connections (AFW, MPA, JPR, RNIFAdapter, CIDXAdapter, BcAdapter). Restart the SAP XI AF Messaging Service and send the message again. Check that all adapter services are started. If required, increase the number of application threads.

**As of Support Package Stack 18 (XI 3.0) and Support Package Stack 09 (XI 7.0)**

In the Visual Administrator, navigate to the "SAP XI AF Core" service and increase the value of the "pollAttempts" parameter to 100 in the "messaging.connectionDefinition" property. Restart the SAP XI AF Core Service and resend the message. Check that all adapter services are started. If required, increase the number of application threads.

**Note**

HTTP 503 is not a timeout error!

**2.2.5 Cluster communication timeout in Adapter Framework Core**

Property of Service "XPI Service: AF Core" within SAP NetWeaver Administrator

`clusterCommunicationTimeoutMsec`.

This specifies the timeout value for the cluster communication in the AS Java Engine. Even though the default value of 15 seconds should be sufficient for the adapter monitoring functionality, you can increase this value in cases where you are experiencing cluster timeout exceptions of the cluster communication mechanism of the Java Engine.

Default: 15000 [ms]

**2.2.6 Cluster timeout in Adapter Framework messaging system**

Property of Service "XPI Service: Messaging System" within SAP NetWeaver Administrator

`messaging.cluster.timeout`

The "messaging.cluster.timeout" property specifies the timeout value for the internal cluster communication of the AS Java Engine. The default value of 60 seconds is very generous. If cluster timeout errors still occur, you must increase this value.

Default: 60000 [ms]
2.2.7 Messaging System times out

Potential cause for the error:
The parameter: 'xiadapter.inbound.timeout.default' is an Adapter Engine messaging system parameter. The value specifies how long the messaging system waits for a response during synchronous communication. If this time elapses, a "MessageExpired" exception is triggered.

This parameter will apply to all synchronous messages going through the Adapter Engine messaging system.

Proposed Solution:
Set property of Service "XPI Adapter: XI" within SAP NetWeaver Administrator

\[ \text{xiadapter.inbound.timeout.default} \]

Default: 180000 [ms]

\[ \text{Note} \]
If this parameter value is not increased to > 3 minutes then the messages will continue to timeout with the message expired exception.

In NWA, Go to->Operation Management->Systems-> Start & Stop -> Java Services -> (Under Related Tasks) Java System Properties.
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Example

Error text looks like this:

```xml
<SAP:Error>
  <SAP:Category>XIAdapterFramework</SAP:Category>
  <SAP:Code>MESSAGE.GENERAL</SAP:Code>
</SAP:Error>
```
2.2.8 XI log showing HTTP CODE 110

Potential cause for the error:
- It is a tricky error which occurs due to timeout on third party system.
- Failure happens while calling the receiver application.
- Generally the web server on receiver side throws the time out error which PI captures and displays in Messaging System.

Example
Error description in sxmb_moni:
```xml
<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
- <! Call Adapter >
- <SAP:Error xmlns:SAP="http://sap.com/xi/XI/Message/30"
  xmlns:SOAP="http://schemas.xmlsoap.org/soap/envelope/" SOAP:mustUnderstand="1">
  <SAP:Category>XIServer</SAP:Category>
  <SAP:Code area="INTERNAL">CLIENT_RECEIVE_FAILED</SAP:Code>
  <SAP:P1>110</SAP:P1>
  <SAP:P2 />
  <SAP:P3 />
  <SAP:P4 />
  <SAP:AdditionalText />
```
2.3 Timeout settings in specific adapters

2.3.1 Java SOAP Sender Adapter

Potential cause for the error:
This is the timeout for synchronous message delivery to the Adapter Framework. It could also result due to delay in the synchronous response from the receiver application.

Proposed Solution:
You can change this value by setting the XI.Timeout parameter in the module configuration table. The value must be set in milliseconds (for example, 300000 for 5 minutes).

Default: 5 minutes
2.3.2 Java SOAP Receiver Adapter

<table>
<thead>
<tr>
<th>Module Key</th>
<th>Parameter Name</th>
<th>Parameter Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>soap</td>
<td>30Timeout</td>
<td>300000</td>
</tr>
</tbody>
</table>
Potential cause for the error:
When the receiver application takes much longer to process the request message and give back the response to the receiver adapter, SOAP on the receiver side can get timed out.

Proposed Solution:
The default timeout value for outbound calls is 5 minutes.
You can increase this value by setting parameter XMBWS.Timeout in the module parameter table of the SOAP receiver adapter. The value must be given in milliseconds. For example, value 600000 represents the timeout value of 10 minutes.
2.3.3 Java RFC Sender Adapter

Potential cause for the error:

When an RFC server sends sRFC call as a synchronous XI message to the Adapter Framework, it uses the module processor. The last module in the chain must be the RFC adapter module (localejbs/RfcAFBean). Within this module, the XI message is sent to the Adapter Framework messaging. This property sets the timeout, which is used to send the message and wait for a response. If the given time elapses, an exception is thrown by the Adapter Framework and sent back to the sender system.

Proposed Solution:

For RFC as the sender, the timeout property for the sync messages will be set in NWA. Property of Service "XPI Adapter: RFC" within SAP NetWeaver Administrator 'syncMessageDeliveryTimeoutMsec'. If the given time has elapsed, an exception is thrown by the Adapter Framework and sent back to the sender.

Default: 300000 [ms]

In NWA, Go to->Operation Management->Systems -> Start & Stop -> Java Services ->(Under Related Tasks) Java System Properties.
2.3.4 Java File adapter

Potential cause for the error (1):
You are experiencing sporadic connectivity problems to the FTP server on the transport or network layer, which result in stalled TCP/IP connections and cause the FTP channel to hang indefinitely. If you are using an FTP receiver channel, the message processing within the Adapter Framework...
stops after the hanging receiver channel has received a certain amount of messages depending on the number of configured worker threads for the Messaging System.

**Proposed Solution (1):**

An updated version of the SAP PI File Adapter allows the configuration of a timeout for FTP sessions that will interrupt the channel's processing if the server has not sent any data for longer than a configurable amount of time.

In order not to break any existing scenarios, the configuration of this timeout requires the use of an advanced mode configuration parameter.

To configure a timeout for the FTP connection, please enable the "Advanced Mode" for the respective FTP communication channel in the Integration Directory and add an entry "ftp.timeout"=timeoutSecs (without any quotation marks) to the "Additional Parameters" section, where timeoutSecs is the desired FTP timeout in seconds.

In more recent support packages you can alternatively set the "Timeout" parameter available in the "FTP Connection Parameters" section.

**Note**

Refer note 849089 for more details

**Potential cause for the error (2):**

You are using Maximum Concurrency parameter of FTP receiver adapter. This parameter ensures that resource pool size (FTP connection size) is limited to specified value per single FTP receiver channel. For instance, setting this parameter to 2 will ensure that a single receiver FTP channel can acquire 2 FTP connections in parallel (if needed).

By default this value is hard coded which results in a timeout.

**Proposed Solution (2):**

Now FTP receiver adapter allows the configuration of a timeout for FTP connection acquiring process. This timeout value will define the maximum waiting time to get the connection from resource pool. If connection is not available within this time, we return the message to Messaging System and the message is in retry mode.

The configuration of this timeout requires the use of an advanced mode configuration parameter.

To configure a timeout for the FTP receiver channels, please enable the "Advanced Mode" for the respective FTP communication channel in the Integration Directory and add an entry "poolWaitingTime" and set to a time in Milli Secs (without any quotation marks) to the "Additional Parameters" section. This parameter is case-sensitive.

**Example**

```
poolWaitingTime 30000
```

**Note**

This note is applicable from SP20 onwards for XI 3.0 and SP12 onwards for XI 7.0. For more details refer to note 1136474.
2.3.5 Java JDBC adapter

Potential cause for the error (1):
When connecting to DB using JDBC adapter there are instances where DB connection take a long time to establish connection. Some times call made to Driver will hang permanently. This results in Connection timeout, time out, query timeout.

Proposed Solution (1):
Setting driver properties would resolve this problem.

- In the advanced mode table section of sender channel and receiver channel configurations, we can set driver properties for each DB connection. Any such property would have to contain prefix ‘driver:’ (with out quotes)

Example
For Oracle Database JDBC thin driver 10.2.0.3 version, the property oracle.jdbc.ReadTimeout helps to set read timeout while reading from the socket. Also for setting login time out in Oracle, we use oracle.net.CONNECT_TIMEOUT. To set these two properties use as follows:

driver:oracle.jdbc.ReadTimeout 1000

driver:oracle.net.CONNECT_TIMEOUT 1000

The TimeOut Driver properties like ReadTimeout and CONNECT_TIMEOUT are in milliseconds
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Note
Please note that properties can vary from each driver version. Please contact DB vendor for the complete list of driver properties.

- In addition to above, we also provide another parameter for query time out. sqlquerytimeout (prefix 'driver:' is not required) is the parameter that is to be used for SQL query time out. This is case-sensitive and should be configured as positive integer value in seconds (greater than 0)

Note
Refer note 1078420 for more details

Potential cause for the error (2):
You are using Maximum Concurrency parameter of JDBC receiver adapter. This parameter ensures that resource pool size (JDBC connection size) is limited to specified value per single JDBC receiver channel. For instance, setting this parameter to 2 will ensure that a single receiver JDBC channel can acquire 2 JDBC connections in parallel (if needed).

By default this value is hard coded which results in a timeout.

Proposed Solution (2):
Now JDBC receiver adapter allows the configuration of a timeout for JDBC connection acquiring process. This timeout value will define the maximum waiting time to get the connection from resource pool. If connection is not available within this time, we return the message to Messaging System and the message is in retry mode.

The configuration of this timeout requires the use of an advanced mode configuration parameter.

To configure a timeout for the JDBC receiver channels, please enable the "Advanced Mode" for the respective JDBC communication channel in the Integration Directory and add an entry "poolWaitingTime" and set to a time in Milli Secs (without any quotation marks) to the "Additional Parameters" section. This parameter is case-sensitive.

Example
poolWaitingTime 30000

Note
This note is applicable from SP20 onwards for XI 3.0 and SP12 onwards for XI 7.0. For more details refer to note 1136474.
2.4 Timeout with Sync/Async Bridge

Potential cause for the error:
Integration Engine closes the synchronous connection to the calling program after the timeout condition is met, and as a result, integration processes fail when the system tries to issue a synchronous response.

Proposed Solution:
Using transaction SXMB_ADMIN ("Configure Integration Engine"), set the parameter CHECK_FOR_ASYNC_RESPONSE_TIMEOUT from the SA_COMM category, if the standard timeout of 60 seconds is too short for your integration process.
## 3. Appendix

**Reference Notes:**

- 824554 - ICM and SAP Web Dispatcher Timeout Parameter
- 737625 - Parameter recommendations for the ICM
- 807000 - Http requests are not fully read after timeout
- 847466 - BPE-TS: Synchronous/asynchronous communication
- 816022 - FAQ: XI/PI 3.0/7.0/7.1 J2EE Adapter Engine/Messaging System
- 849089 - XI 3.0 / PI 7.0 File Adapter: FTP Timeout Handling
- 1136474 - XI 3.0/7.0: Setting Timeout for acquiring DB/FTP resources
- 1078420 - XI/PI JDBC Adapter: Setting JDBC driver properties for DB
www.sdn.sap.com/irj/sdn/howtoguides