AMQ9271E error messages for MQ client connections: [TIMEOUT] 65 seconds

https://www.ibm.com/support/pages/node/6561647

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+++ Question

You would like to get more information on the following pair of error messages that are shown in the MQ error log:

AMQ9271E: Channel 'ChannelName' timed out.
         ACTION: ... [TIMEOUT] 65 seconds ...
AMQ9999E: Channel 'ChannelName' to host 'x.x.x.x' ended abnormally.

++ Description

The following show the complete pair of errors:

```
----- amqcrhna.c : 361 -------------------------------------------
02/20/22 12:24:21 - Process(16646626.3987) User(mqm) Program(amqrmppa)
        Host(Server1) Installation(Installation1)
        VRMF(9.1.0.7) QMgr(TEST)
        Time(2022-02-20T09:24:21.081Z)
        RemoteHost(x.x.x.x.x)
        CommentInsert1(TEST.SVRCONN)
        CommentInsert2(x.x.x.x.x)
        CommentInsert3(select() [TIMEOUT] 65 seconds)

AMQ9271E: Channel 'TEST.SVRCONN' timed out.

EXPLANATION:
A timeout occurred while waiting to receive from the other end of channel
'TEST.SVRCONN'. The address of the remote end of the connection was
'x.x.x.x.x'.

ACTION:
The return code from the select() [TIMEOUT] 65 seconds call was 0 (X'0').
Record these values and tell the systems administrator.
----- amqccita.c : 4893 -------------------------------------------
02/20/22 12:24:21 - Process(16646626.3987) User(mqm) Program(amqrmppa)
        Host(mqm) Installation(Installation1)
```

```
        VRMF(9.1.0.7) QMgr(TEST)
        Time(2022-02-20T09:24:21.081Z)
        CommentInsert1(TEST.SVRCONN)
        CommentInsert2(16646626)
        CommentInsert3(x.x.x.x)
```

AMQ9999E: Channel 'TEST.SVRCONN' to host 'x.x.x.x' ended abnormally.

```
EXPLANATION:
The channel program running under process ID 16646626 for channel
'TEST.SVRCONN' ended abnormally. The host name is 'x.x.x.x'; in some cases
the host name cannot be determined and so is shown as '????'.
ACTION:
Look at previous error messages for the channel program in the error logs to
determine the cause of the failure. Note that this message can be excluded
completely or suppressed by tuning the "ExcludeMessage" or "SuppressMessage"
attributes under the "QMErrorLog" stanza in qm.ini. Further information can be
found in the System Administration Guide.
```

++ Background

The crux of the issue is the **Heartbeat Interval** has occurred and then the queue manager waits for a response from the other side (MQ client application) via the **Receive Timeout**.

https://www.ibm.com/docs/en/ibm-mq/9.2?topic=ccf-checking-that-other-end-channel-is-still-available
```
IBM MQ / 9.2 /
Checking that the other end of the channel is still available
You can use the heartbeat interval, the keep alive interval, and the receive timeout, to
check that the other end of the channel is available.
```

It is not the **Heartbeat Interval** on its own that decides to close the channel.
There is a another parameter called **Receive Timeout** which decides how long to wait for the
reply to the heartbeat, before making the assumption that the connection is 'dead'. Effectively,
this is just logical concept of how long we will tolerate receiving no transmission from the
remote side.

After the channels negotiate an HBINT value:
- If the HBINT is set to less than 60 seconds, the Receive Timeout value is set to **twice** this value.
- If the HBINT is set to 60 seconds or more, the Receive Timeout value is set to 60 seconds greater than
the value of HBINT.

There is a distinction between:
-- how long the channel has waited in total (Receive Timeout),
-- versus how long it waited on the select call being reported in the AMQError log.

Consider this example using the 'amqsputc' sample application with a HBINT=20 on the svrconn channel definition

T= 0 : amqsputc issues a MQCONN (initial data exchange; uid flows; MQCONN TSH; MQCONN REPLY TSH).

T= 0 : The svrconn channel is waiting for an API call from amqsputc, in a socket select() call. This has a timeout of 25 seconds (HBINT + 5. Since we are not the initiating side, we add 5 seconds to offset the heartbeating for efficiency.

T= 0 : Suspend amqsputc with "kill -stop <amqsputc_pid>.

T=20: 20 seconds pass – if it was not suspended, amqsputc should send a heartbeat here.

T=25: A further 5 seconds pass, at which point the svrconn's select call, times out (but we do not report that in the MQ log)

T=25: The svrconn realizes it has had nothing from the remote side, so sends a heartbeat request.

T=25: The svrconn then waits 25 seconds for a heartbeat reply.

T=50: After 25 seconds, the svrconn comes back empty handed, reports the error AMQ9271 and shuts down the channel.

So even though 20 seconds was set for the HBINT, in practice, the entire wait was 50 seconds before the AMQ9271E error was returned.

++ Comments about the "65 seconds"

Let's review in more detail the paragraph in red from the ACTION section for the example of
AMQ9271E:

AMQ9271E: Channel 'TEST.SVRCONN' timed out.
EXPLANATION:
A timeout occurred while waiting to receive from the other end of channel
'TEST.SVRCONN'. The address of the remote end of the connection was
'x.x.x.x'.
ACTION:
The return code from the select() [TIMEOUT] **65 seconds** call was 0 (X'0').

The **65 seconds** applies when the queue manager is waiting for a heartbeat response:
The HBINT expires and the queue manager sends a Hearbeat (HB) Request, and then waits 65 seconds
for the HB response.
If there is no HB response during the 65 seconds, the queue manager will terminate the channel.
However, this **HBINT expiry is not logged to the error log (which causes confusion).**
The subsequent lack of the HB response is what causes the error AMQ9271 to be reported in the error
log.

**The extra 5 seconds happens later, where the server side of the connection always
adds 5 seconds to its wait times, to reduce the risk of both ends deciding to
heartbeat or time out at the same time.**

++ Comments the timeout is other than 65 seconds

If the timeout mentioned in the error AMQ9271 is something other than 65 seconds, then the issue may be that the Disconnect Interval (DISCINT) setting on the SVRCONN channel has been reached and the channel is terminated.

At MQ 9.2.2 CD the AMQ9271E message was improved to identify situations where the DISCINT timer was reached.

1/2/2022 09:33:17 - Process(15712.7) User(SYSTEM) Program(amqrmppa)
            Host(Server1) Installation(Installation1)
            VRMF(9.2.2.0) QMgr(TEST)
            Time(2022-01-02T14:33:17.886Z)
            CommentInsert1(TEST.SVRCONN)
            CommentInsert2(15712(25164))
            CommentInsert3(127.0.0.1)
AMQ9271E: Channel 'TEST.SVRCONN' timed out.
EXPLANATION:
A timeout occurred while waiting to receive from the other end of channel
'TEST.SVRCONN'. The address of the remote end of the connection was
'127.0.0.1'.
ACTION:
The return code from the (recv) [DISCINT TIMEOUT] 30 seconds call was 0 (X'0').
Record these values and tell the systems administrator.

+++ end