FCT SMPP Retryable status 406 warnings causing duplicate SMS messages

The purpose of this document is to bring together the research and analysis performed by Monitise to help root cause the issue with duplicate SMS messages.

Summary:

When an alarm is triggered, Support has followed a procedure outlined by a former Monitise Support engineer based on his experience with Teleios. This workaround to date has been hit or miss as it is unknown if Teleios performs a reset at the same time. In most recent cases we restart Alerts and CMS and still reach out to Teleios to reset the connection to Monitise to end the event.

Monitise does not have any visibility into the health of any of the carriers during the times we receive the high number of -0 or -406 responses as was the case back in 2014.

We have previously asked Teleios to review carrier change notifications for the past few years. This question not been answered.

I have been informed that Teleios does a pass thru of the carrier status and that they do not control this.

Teleios continues to recommend that that we change the way Monitise handles the -406 return codes which we should investigate a part of a maintenance release after the 5.1.7 Go Live.

Some of the other outstanding questions are below:

1. What carriers is Teleios connected to? Many carriers connected but only B Mobile is using the -406 status

2. Have any carriers made policy or response changes in the last 4 years? No changes to policy or status codes

3. What proactive monitoring does Teleios have in place as described on 09 May 2014? TBD - Ikechi

**06 May 2014**

This is the first occurrence that I found where JD Henderson (former Monitise Support) had informed Teleios and FCT that our monitoring system had triggered on a high rate of “Retryable submission failure: error code=0 “

From: JD Henderson [mailto:John-David.Henderson@monitise.com]

Sent: Tuesday, May 6, 2014 9:23 PM

To: janak.maraj@firstcitizenstt.com; Mobile\_support@firstcitizenstt.com (mobile\_support@firstcitizenstt.com); Mobile Banking Support

Cc: ClairMail Support

Subject: FW: Alert: FCT-PROD2/CMS\_Logs-cmserver is CRITICAL

Teleios Help Desk

We are occasionally seeing these “Retryable submission failure: error code=0 “ errors.

We think it may be due to a Carrier that is not allowing SMS messages at this time.

This is NOT happening to all messages going outbound.

We do not know what Carrier this is that would be denying message, or if that is the case at all at this point.

Can you please investigate this? WE have already restarted our services twice, and about 20 minutes later, we start seeing these again.

“Retryable submission failure: error code=0 “

Upon a reset of the Teleios connection to Monitise the errors subsided in this case and Teleios was investigating the “underlying” issue as described below.

**From**: Teleios HelpDesk   
**To**: Khan, Dennis; Teleios HelpDesk ; [John-David.Henderson@monitise.com](mailto:John-David.Henderson@monitise.com) ; Maraj, Janak; [mobile\_support@firstcitizenstt.com](mailto:mobile_support@firstcitizenstt.com) ; Mobile Banking Support   
**Cc**: [cmsupport@monitise.com](mailto:cmsupport@monitise.com)   
**Sent**: Tue May 06 21:52:34 2014  
**Subject**: RE: Alert: FCT-PROD2/CMS\_Logs-cmserver is CRITICAL

Good night Dennis,

We are still investigating the underlying issue, but a restart of the service on our end seemed to have assisted with the problem. We are currently in the process of continuing close monitoring.

Regards,

Geon Bell

MessageCentral Administrator

MessageCentral Operations

Teleios Systems Limited

4B Alexandra St.

St. Clair, Port of Spain

Trinidad

P: 868.622.0940

F: 868.622.0941

[http://www.teleios-systems.com](http://www.teleios-systems.com/)

**From:** Khan, Dennis [<mailto:Dennis.Khan@Firstcitizenstt.com>]   
**Sent:** Tuesday, May 6, 2014 9:42 PM  
**To:** Teleios HelpDesk; [John-David.Henderson@monitise.com](mailto:John-David.Henderson@monitise.com); Maraj, Janak; [mobile\_support@firstcitizenstt.com](mailto:mobile_support@firstcitizenstt.com); Mobile Banking Support  
**Cc:** [cmsupport@monitise.com](mailto:cmsupport@monitise.com)  
**Subject:** Re: Alert: FCT-PROD2/CMS\_Logs-cmserver is CRITICAL

Hi Folks,  
  
I am receiving balances via text once again.  
  
Teleios Helpdesk,  
  
Please advise what was the issue and what were the corrective measures applied.  
  
Regards,  
Dennis. Khan

The action plan as written up by Dale Wilson @ Teleios describes the action plan for lessons learned in this first case. In my experience, I question these bullets below as they have not triggered any proactive notification from Teleios and maybe one (1) support case where Teleios observed an issue with our connection. FCT has notified Monitise a couple of times when they see certain events from their “Console”

I would like to know what carriers were impacted and what the Teleios engineers observed that they were waiting for a response from a carrier.

**From:** Dale Wilson [<mailto:dale.wilson@teleios-systems.com>]   
**Sent:** Friday, 09 May 2014 03:07 PM  
**To:** Khan, Dennis; Teleios HelpDesk; [John-David.Henderson@monitise.com](mailto:John-David.Henderson@monitise.com); Maraj, Janak; [mobile\_support@firstcitizenstt.com](mailto:mobile_support@firstcitizenstt.com); Mobile Banking Support  
**Cc:** [cmsupport@monitise.com](mailto:cmsupport@monitise.com)  
**Subject:** RE: Alert: FCT-PROD2/CMS\_Logs-cmserver is CRITICAL

Good Day All

Our apologies for the length of time for a response but we are still awaiting word from one of the carriers regarding an observation our team made.

We can confirm thus far that the carrier was not responding to our message submissions as required by the SMTP specification and that may have caused our system to begin queuing up messages (no messages were lost).

In the meantime we have engaged in implementing the following:

         Updating our monitoring application to display additional system parameters which would give an indication of occurrences such as these

         Creation of a separate notification application that will alert the monitoring team to potential issues such as these

         Updated specification requirements for the next major release version of our monitoring application to include these measures

         Updating monitoring personnel of said changes in the applications

We will keep you updated regarding any response from the carrier.

Regards

Dale Wilson

Manager, Teleios Operations Group | Strategic Information Systems

**09 Dec 2016**

Hi Eileen,

In recent times we've noticed that your endpoint at times, stops sending deliver\_sm\_resp packets in response to deliver\_sm packets that we send. What is the reason for this? It is the source of the problem.

When our endpoint does not receive a response from yours, it assumes that yours is unable to process requests at the time and so we store the messages in an attempt to buffer, until your endpoint begins responding. Only a reset of the connection or a response from your endpoint, in accordance with proper SMPP specification can rectify this.

I've reset the connection in the interest of time but that is only a temporary fix and does not solve the core problem, which is non-response to deliver\_sm packets with deliver\_sm\_resp packets by your endpoint. Can you have a look at that and provide feedback concerning what may be causing that issue to occur?

Thanks

**Ikechi Griffith**

**24 March 2016**

Meeting held to explain the Monitise research and outline our plan.

Attendees:

First Citizens Bank – Mr. Dennis Khan, Mr. Alan Su Kwan Hang

Teleios: Ikechi, Geon, Dale

Monitise: Justin, Lesli, Manuel

High level summary of impact:

Mr. Khan of First Citizens bank provided an account of the instability of the Monitise 4.1 application beginning in late 2015 (August). Since that time there have been members of the Bank that have received a high number of duplicate SMS alerts to their mobile devices causing a financial impact to both the members and the Bank. The Bank has observed a rise in the number of incidents which have resulted in the above behaviour and have engaged Monitise and Teleios (Aggregator) to determine root cause. The Bank has a Monitise 5.1.7 upgrade project in flight which is targeted for launch July 2016.

Monitise Analysis:

The data that Support has collected from these incidents and the additional analysis from our solutions engineer there were two (2) types of statuses being returned to Monitise from the Carriers via Teleios. One is -0 and the other is -406. Per Teleios the status code from the carrier is not modified and passed directly to Monitise. A high number of these warning has been found to precede impact to the Monitise application.

There have been reports from Teleios when they do not receive a corresponding deliver\_sm\_resp packet in response to a deliver\_sm packet that Teleios sends. These two scenarios have required a restart of systems on one or both ends. During this investigation it was found that the current solution does not have a working Disconnected process that uses files to update Monitise database with any Disconnected numbers from the carriers. A -406 response to MSID being expired whereas the -0 is for according to Teleios a successful handover or No Error according to the attached guide that Teleios provided.

One of the first alerts from August 2nd can be seen below.

2015-09-02 16:03:16,452 [Teleios1-notifier1-thread-8] WARN [SmppServerComponent:retryableSubmissionFailure] Retryable submission failure: error code=0 on correlation id 2C1D8408-8ABB-202F-FC7D-12344C0AE26A

The -406 status seems to have now replaced the -0 in volume as was seen during this past week. In the past there was less frequency of the expired status (-406) compared to the no error (-0)

2016-03-25 01:34:04,165 [Teleios1-notifier1-thread-3] WARN  [SmppServerComponent:retryableSubmissionFailure] Retryable submission failure:  error code=406 on correlation id D6AE9974-FA92-84AD-C9D7-DFFB08453821

This issue was found to have happened to another Monitise customer who was on a later release of Monitise (4.4). In researching that past incident that occurred back in 2012 the issue was triggered in this case of an Aggregators extended outage. One the outage was over and because multiple customer were sharing the same entry point the aggregators capacity was insufficient which caused a delay in responses to Monitise for alerts sent which caused the Monitise system to resend the alert causing the banks members to receive duplicate alerts. There is a fix that was prepared that would throttle alerts to avoid saturation but it was never utilized. In that case the largest of the customers sharing the connection to Mblox was given their own access point which mitigated the issue.

Workaround:

When a threshold is reached for the number of SMPP Retryable warnings or queuing of outbound SMS messages is received, either Monitise or Teleios or both need restart applications to mitigate the issue.

Action Items:

1. Monitise solutions engineer will research the current SMPP retry mechanism.

2. Monitise solutions engineer will research how the status events are handled by the application.

3. Monitise will determine if the 4.4 fix can/should be backported to 4.1.

4. Monitise recommends that the network connectivity between First Citizens and Teleios be reviewed and monitored for any errors or capacity bottlenecks.

5. Monitise further recommends that Teleios check each Carrier’s change notifications between June and August 2015 to determine if one or more carriers network began submitting new or more volume of the results -0 and/or -406 then previous months.

From: Manuel Morales [mailto:Manuel.Morales@monitise.com]

Sent: Thursday, 31 March 2016 03:35 PM

To: Khan, Dennis; Siu Kwan Hang, Alan

Cc: Justin Wilks; Todd Fenley; Glenn Kuhn; Lesli Glancy; Todd Fenley; Patty Ashauer; Terry Pilch; Phil.Collins@fisglobal.com; Koike, Wes; Dale Wilson; Ikechi Griffith (ikechi.griffith@teleios-systems.com); Eileen Javar; Terry Pilch

Subject: RE: Status Update on Mobilebanking Service Breaks and Multiple Texts - Call time 3pm EST [ ref:\_00D30bdE.\_50032yZfcE:ref ]

Hi Dennis,

I was on the call. Here is the update from our solutions engineer around the analysis of the current solution.

I am OOO tomorrow but back on Monday. Can we please get an update from Teleios if this is one carrier that is submitting the 406 status since late 2015 until now?

We also know that there is no working disconnect number process in the FCT solution at this time so all numbers default to False.

Regards,

Manuel

CSS analysis related to Issue:

As we are getting many responses with 406, all the messages with this status code are considered as Retryable. Which causes "Retryable Submission Failure". Status code 406 is configured as Retryable message in our system assuming that all the aggregators send this code in case of Retryable scenario.

Reference: Mblox error codes:

[http://manage.mblox.com/developers/sms.html#delivery-report-error-codes82](http://manage.mblox.com/developers/sms.html%23delivery-report-error-codes82)

|  |  |  |  |
| --- | --- | --- | --- |
| 406 | Internal Expiry | Aborted | Message was expired before reaching SMSC. |

In Mblox this code is sent in case - Message was expired before reaching SMSC.

• If only one carrier is sending 406 for disconnected numbers, then I think this should be handled at Teleios end.

• I don't think that hotfix from 4.4 will solve this 406 issue.

Work flow

1. For every message an entry is made to cm\_checkpoint table.

2. In SmppServerComponent.send() triggers the initial message to Teleios.

3. As per the response status from Teleios following operations will be performed-

|  |  |  |  |
| --- | --- | --- | --- |
| **Check number** | **Status** | **Action** | **status in cm\_checkpoint table** |
| 1 | 0 | Submission Accepted | STATUS\_OK |
| 2 | 406, 410, 412, 415, 41C, 41E, 41F, 422, 426 | Retryable Submission Failure | STATUS\_RETRYABLE\_DELIVERY\_FAIL |
| 3 | Right now in current code this is not handled properly, we have a method *VerisignTransceiver.isDisconnectRequired(status)* which is called to check the status with disconnected codes. But right now it always return **false** | Due to false output never executes DisconnectNumberFailure, Ideally it should | STATUS\_DISCONNECTED\_USER\_IGNORED |
| 4 | Other error | Fatal Submission Failure | STATUS\_FATAL\_DELIVERY\_FAIL |

**SelfManagingSmppConnection.java**

if (status == 0) {

//Success

fireSubmissionAccepted(orig, smr.getMessageId());

} else {

if (isRetryable(status)) {

fireRetryableSubmissionFailure(orig, smr.getMessageId(), status);

} else if (isDisconnectRequired(status)) {

fireFatalSubmissionWithDisconnectNumberFailure(orig, smr.getMessageId(), status);

} else {

fireFatalSubmissionFailure(orig, smr.getMessageId(), status);

}

}

**SMPP retry mechanism:**

In MessageRedeliveryServiceImpl class we are fetching all the entries from *cm\_checkpoint* table for which status is retryable

And the processes of sending message is invoked

Following properties are set for re-delivery

|  |
| --- |
| **cmservice.properties** |
| recovery.checkpoint.interval=5000 |
| recovery.checkpoint.queue.size=2000 |
| redelivery.interval.randomize=true |
| redelivery.interval.low=5000 |
| redelivery.interval.high=10000 |
| redelivery.initial.retry.attempts=5 |
| redelivery.max.attempts=62 |

For every re-delivery maximum number of attempts are set to 62

|  |
| --- |
| **From:** Manuel Morales  **Sent:** Tuesday, May 24, 2016 2:31 PM  **To:** Khan, Dennis  **Cc:** Maraj, Janak; Philip, Maurice; Siu Kwan Hang, Alan; Romero, Robert; [Phil.Collins@fisglobal.com](mailto:Phil.Collins@fisglobal.com); Terry Pilch; Lesli Glancy; Justin Wilks; Glenn Kuhn  **Subject:** RE: Case 00039464: FCT- Retryable submission failure [ref:\_00D30bdE.\_500321113de:ref] |

Hi Dennis,

The reason you receive multiple alerts is because Monitise receives a high rate of Retryable Submission failures via Teleios from one or more carriers at the same time. The suspicion has always been upstream of our system as this has not had issues up until 1 year ago. This could be due network connectivity between FCT and Teleios and/or Teleios and a carrier.

I am not familiar with the number of carriers to choose from in Trinidad and Tobago but it would help to know if the duplicate alerts are coming to bank members on the same carrier or multiple carriers?

We have not had any issues for months and then on Friday there was an incident. Again nothing has changed on the Monitise side and we did not receive any reports from Teleios of any problems on their end during this time.

I have been thinking of what we can do to potentially avoid duplicates but the only recourse that we can think of is to flush the pending alerts from the database each time we restart. This is a brute force approach as it will remove the first alert as well and that could cause frustration and call to your customer centre.

We can also revisit a code change that was noted previously though I do not believe it will make any difference.

From our developers point of few the system is working as designed.

As we are getting many responses with 406, all the messages with this status code are considered as retryable. Which causes "Retryable Submission Failure". Status code 406 is configured as a retryable message in our system assuming that all the aggregators send this code in case of retryable scenario. See Mblox error codes: <http://manage.mblox.com/developers/sms.html#delivery-report-error-codes82>.

For Mblox this code is sent in case - Message was expired before reaching SMSC.

•If only one carrier is sending 406 for disconnected numbers, then we think this should be handled at Teleios/Carrier end.

**06 June 2016**

**From:** Ikechi Griffith <[ikechi.griffith@teleios-systems.com](mailto:ikechi.griffith@teleios-systems.com)>  
**Sent:** Wednesday, June 8, 2016 8:13 PM  
**To:** Khan, Dennis; Dale Wilson; Manuel Morales  
**Cc:** Maraj, Janak; Philip, Maurice; Siu Kwan Hang, Alan; Romero, Robert; [Phil.Collins@fisglobal.com](mailto:Phil.Collins@fisglobal.com); Terry Pilch; Lesli Glancy; Justin Wilks; Glenn Kuhn; Geon Bell; Teleios HelpDesk; Irwin Williams  
**Subject:** RE: Case 00039464: FCT- Retryable submission failure [ref:\_00D30bdE.\_500321113de:ref]

Hi Monitise / Dennis,

We're looking further into this issue. We have established a few things so far and will provide the following guidance and a further update when we find more.

**1)      For every submit\_sm there has to be a corresponding submit\_sm\_resp packet**

a.      We've noticed that when the issue of duplicates occur, the submit\_sm\_resp packets aren't returned immediately which is seen by Monetise as a case for retying the message. Retying the message is good application logic, given the nature of the protocol, but the rate of retry causes a number of things to happen.

                                                              i.      Because the rate of retry is too high, carriers throw throttling errors indicating that too many messages are being pushed at the same time.

                                                            ii.      Users are receiving the messages in some cases, but the submit\_sm\_resp packets aren’t handed over. They are sometimes returned later or you may notice a delivery receipt before receiving the submit\_sm\_resp, which indicates successful delivery of the message.

                                                          iii.      Customers receive multiple messages which becomes an annoyance

b.      We’re investigating the reason for the late or non-delivery of the submit\_sm\_resp packets

**2)      Error 406, returned by the carrier in the submit\_sm\_resp packet, is a custom error and does not warrant a retry.**

a.      This error is in a custom field in the SMPP submit\_sm\_resp  packet. It is not a standard SMPP error and so different vendors use it differently.

                                                              i.      I know that Monitise provided documentation on what error 406 means but I would like to respectfully disagree with it and reiterate that the context referenced in the documentation is related to delivery status packets and not submit\_sm\_resp packets. I will further emphasize the fact that a submit\_sm\_resp is returned, means that the carrier interface received it and responded, contrary to what the documentation provided by Monitise states concerning its expiry.

                                                            ii.      I again emphasize that error 406 is a custom error, returned in the submit\_sm\_resp packets, that is vendor specific. That means, that different vendors can put different messages in the field. As I would have indicated in a previous meeting, error 406 is an internal carrier error indicating an invalid number in the system. Another error you might have noticed is error 40b, which indicates that the subscriber has insufficient credit.

                                                          iii.      Again I emphasize that but will provide various vendors’ interpretation of error 406 to reiterate that it is a custom error and can safely be ignored instead of retried. Error 40b can be ignored as well, in case those are also retried by Monitise.

1.      <http://mayermobile.at/SMS%20Platform%20SMPP%20API%20v1.1.pdf>

2.      <http://okroute.com/wp-content/uploads/2015/08/OKROUTE-Error-Code-List.pdf>

3.      <http://help.mailup.com/display/MUG/SMS+Error+codes>

**Recommendations:**

Monitise should examine the retry logic and the frequency that retries occur. My suggestion is to either wait for a longer period to receive the submit\_sm\_resp packet before retrying or if a delivery receipt packet is received, for a message, before the submit\_sm\_resp is returned, you will know that the user received the message successfully and there would be no need to retry for lack or or late delivery of a submit\_sm\_resp.

Monitise should not retry messages with 40b or 406 vendor specific error codes. One indicates insufficient balance, the other an internal error due to an invalid MSISDN.

Teleios would continue investigation concerning the late or non-delivery of submit\_sm\_resp packets to Monitise and would provide an update.

Salesforce cases show how infrequent this behaviour is from our point of view.

