

Google Cloud Issue Summary

Gmail - 2020-12-14 and 2020-12-15

All dates/times relative to US/Pacific

On 2020-12-14 from 14:16 to 16:38 and on 2020-12-15 from 11:38 to 15:57, for a combined total of 6 hours and 41 minutes, a subset of Gmail users experienced email delivery issues. During this time, the service responsible for handling incoming SMTP (Simple Mail Transfer Protocol) connections incorrectly responded with an error to emails being sent to "@gmail.com" users. The error message indicated that the email address did not exist, and as a result, the impacted emails were never delivered.

Email delivery to other email addresses on Google-hosted domains, including those owned by Google Workspace customers, were not affected by this issue and continued to function correctly.

We understand that this issue has impacted our valued customers and users, and we apologize to those who were affected.

DETAILED DESCRIPTION OF IMPACT

During the time periods of both occurrences of the issue, when the Google SMTP service accepted an inbound connection and the sender specified any recipient email address ending in "@gmail.com", the service incorrectly responded with SMTP error code 550 (meaning "mailbox unavailable") in response to the SMTP "RCPT TO" command which specifies the recipient of the email. This error prevented the inbound SMTP client from transmitting the email body.

SMTP clients conforming to email standards treat error code 550 as a permanent delivery error and do not attempt to resend the email. In response to a permanent delivery error, intermediate SMTP relays send a bounce email back to the original sender, informing them of the delivery error.

Affected senders may have received a bounce email generated by an intermediate SMTP service. In some cases, the full SMTP error message was quoted in the bounce email. The behavior of these messages depended on the external SMTP clients connecting to the Google SMTP service.

To allow identification of this issue from SMTP logs, the full SMTP error message was:

```
550-5.1.1 The email account that you tried to reach does not exist. Please try
550-5.1.1 double-checking the recipient's email address for typos or
550-5.1.1 unnecessary spaces. Learn more at
550 5.1.1 https://support.google.com/mail/?p=NoSuchUser {server-id} - gsmtmp
```

The "{server-id}" string is replaced by an identifier that the SMTP server sends to assist with diagnostics. Intermediate external systems may have reformatted the error message by joining the lines of the response to form a single line.

ROOT CAUSE

Background: The Gmail SMTP inbound service uses a configuration system that allows specific service options and flags to be changed while the service is already deployed in production. The "gmail.com" domain name is specified as one of these configuration options. An ongoing migration was in effect to update this underlying configuration system to meet Google internal best practices.

A configuration change during this migration shifted the formatting behavior of a service option so that it incorrectly provided an invalid domain name, instead of the intended "gmail.com" domain name, to the Google SMTP inbound service. As a result, the service incorrectly transformed lookups of certain email addresses ending in "@gmail.com" into non-existent email addresses.

When the Gmail user accounts service checked each of these non-existent email addresses, the service could not detect a valid user, resulting in SMTP error code 550.

REMEDATION AND PREVENTION

On 2020-12-14, Google Engineering began receiving internal user reports of delivery errors.

A code change which updated the configuration was identified as having a compatibility issue. Believing that this was the root cause, Google Engineering reverted the code change, which resolved the immediate issue.

On 2020-12-15, the configuration system was updated again, then an email delivery monitoring system automatically alerted Google Engineering when the number of delivery errors exceeded the configured alerting threshold. The formatting error of the configuration option specifically for the "gmail.com" domain name was identified from internal logs. Google Engineering identified that the error was caused by the configuration system update and reverted the change again.

The Gmail inbound SMTP service has already sent bounce messages to users whose emails could not be delivered.

To guard against the issue recurring and to reduce the impact of similar events, we are taking the following actions:

- Update the existing configuration difference tests to detect unexpected changes to the SMTP service configuration before applying the change.
- Improve internal service logging to allow more accurate and faster diagnosis of similar types of errors.
- Implement additional restrictions on configuration changes that may affect production resources globally.
- Improve static analysis tooling for configuration differences to more accurately project differences in production behavior.

Google is committed to quickly and continually improving our technology and operations to prevent service disruptions. We appreciate your patience and apologize again for any impact to your organization. We thank you for your business.

Sincerely,

The Google Workspace Team