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SMTP Service Extension for
Immediate Delivery

[draft-ietf-fax-smtp-session-04.txt](#)

Status of this memo

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NOTE: although this work has been discussed in the IETF-FAX working group, it does not purport to represent the consensus of the group.

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Abstract

This memo defines an extension to SMTP which provides a mechanism for requesting immediate message delivery over SMTP instead of normal store-and-forward delivery. It also provides a mechanism for querying the SMTP server if immediate delivery was successful, is still in progress, or was simply queued as a normal store-and-forward message.

0. Administrivia

0.1. Changes Since Previous Versions

Changes from -03 to -04:

- * Added "failed" code.
- * Added status=x.y.z, where x.y.z is from [RFC1893](#) and FAX Report Extensions [REPORT-EXTEND].

Changes from [draft-ietf-fax-smtp-session-02.txt](#) to -03:

- * Corrected grammar and typos. Added clarifications to some areas.

Changes from [draft-ietf-fax-smtp-session-01.txt](#) to -02:

- * Added sequence of events and state diagram sections to clarify timing and responsibility issues.
- * Server's reply to STAT is now a sequence of simple codes instead of a multipart/report.
- * STAT command polls for all recipients that had SESSION on the RCPT command.

Changes from [draft-ietf-fax-smtp-session-00.txt](#) to -01:

- * Added copyright notice
- * Reference to [FAX-DSN].

Changes from [draft-wing-smtp-session-00](#) to [draft-ietf-fax-smtp-session-00.txt](#):

- * Server's reply to STAT is now a complete multipart/report
- * Language clarifications
- * Require immediate SMTP server reply after client sends "."
- * Specify SMTP server must respond to STAT within 30 seconds

1. Introduction

Historically, SMTP [[RFC821](#)] has been used for store and forward delivery of messages. This memo describes a new SMTP extension called SESSION. This new extension allows an SMTP client to request immediate delivery by the SMTP server.

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This Session extension was motivated by an analysis of the requirements for using the Internet to deliver fax messages, and, coupled with a mechanism for exchanging capabilities and preferences of sender and recipient, can be used by email<->fax gateway applications. In addition, the SESSION extension may be useful for other messaging applications where immediate delivery and confirmation of immediate delivery are requested.

The LMTP protocol [[RFC2033](#)] provides immediate delivery, but as discussed in [[RFC2033](#)] can aggravate the duplicate message delivery problem [[RFC1047](#)], especially over a WAN. The Session extension described in this memo is intended to provide immediate delivery of SMTP messages without aggravating the duplicate message delivery problem.

This extension presumes either a direct connection between sender and recipient or a chain of session-enabled servers in which each supports this Session extension.

If an MTA in the SMTP "path" does not support Session, delivery automatically falls back to normal store and forward, and such fallback is communicated to the SMTP client, as described in [section 3.2](#).

Unlike the deprecated SAML, SOML and SEND commands (documented in [[RFC821](#)] and deprecated in [[DRUMS](#)]) the SESSION extension allows for a mix of immediate and store & forward delivery recipients.

This memo uses the mechanism described in [[RFC1869](#)] to define an extension to the SMTP protocol for immediate delivery.

[1.2.](#) Discussion of This Draft

This draft is being discussed on the "ietf-fax" mailing list. To subscribe, send a message to <ietf-fax-request@imc.org> with the line "subscribe" in the body of the message. Archives are available from <http://www.imc.org/ietf-fax>.

[1.3.](#) Requirements Notation

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

[2.](#) Framework for Immediate Delivery Support

The immediate message delivery is defined as follows:

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- (1) The name of the immediate extension is Session;
- (2) the EHLO keyword value associated with the immediate extension is SESSION;
- (3) no parameter is used with the SESSION EHLO keyword;
- (4) one new SMTP verb, STAT (used to determine if immediate delivery was successful) is defined with this extension, and is described in [section 3](#);
- (5) one optional parameter is added to the RCPT command, using the esmtp-keyword SESSION, and is described in [section 4](#),

no parameters are added to the MAIL FROM command;
- (6) the maximum length of a RCPT TO is increased by 8 characters.

[3.](#) Esmtp-keyword SESSION

Upon receiving a RCPT command with the esmtp-keyword SESSION, a session-enabled server will normally send either a positive (2xx) or negative (5xx) reply to the SMTP client.

A 250 reply code indicates that the session-enabled server believes the message will be sent immediately -- that is, that the request for SESSION delivery will be honored.

If a session-enabled server is aware that it will be unable to send the message immediately (that is, the request for SESSION will not be honored), but the session-enabled server is willing to send the message via its normal SMTP queue, it SHOULD respond with a 252 reply code. The SMTP client can use this information to inform the user that immediate delivery isn't available, and the SMTP client (or the user) may decide on a different transmission mechanism.

[3.1.](#) Delivery Responsibility

As per normal SMTP, once a sender has received a positive response to its end of mail data indicator, the receiver has accepted all responsibility for message delivery.

If an MTA is relaying a message using this Session extension, and it fails to receive a positive response to its end of mail data indicator from the next-hop mailer, the Session-enabled MTA MUST queue the message as a normal SMTP store-and-forward message for later delivery. This is because the MTA performing the relaying

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accepted responsibility for message delivery at this point. See the section "Sequence of Events" for details.

3.2. Fallback to Store and Forward

This section describes scenarios which would cause immediate delivery to fallback to normal store-and-forward delivery.

3.2.1. Mailers that do not implement this Session extension

If an MTA is encountered which does not support the Session extension, the MTA which detected this SHOULD respond to its incoming SMTP connection with a 252 response code. As Session delivery is not possible to the next-hop mailer, normal store-and-forward mail delivery will occur.

3.2.1. Excessive Delays with Multiple MTAs

The cumulative delays of going through many MTAs will cause Session delivery to fail (by falling back to normal store-and-forward). Proper configuration and deployment of SMTP servers will prevent this problem.

Implementors must carefully design session-enabled MTAs to respond quickly when Session recipients are present to minimize timing problems. Each MTA is maintaining its own SMTP timeouts which can't be exceeded by the entire end-to-end delay [[RFC1123](#)].

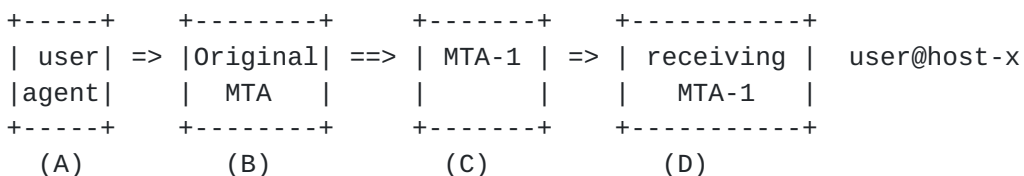
Additionally, Session is not expected to work reliably across lossy links or with overloaded mailers.

3.3. Sequence of Events and State Diagrams

This section describes the sequence of events for a RCPT command that contains the esmtp-keyword SESSION, and also includes State Diagrams for various components.

3.3.1. Events - Single Remote MTA

If the RCPT command contains the esmtp-keyword SESSION, the SMTP server SHOULD connect to the next-hop mailer prior to responding to the SMTP client's RCPT command.



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Using the above diagram:

1. the SMTP client (A) would initiate an SMTP transaction with (B), and send a RCPT command with the esmtp-keyword SESSION to (B), then
2. (B) would initiate an SMTP transaction with (C) and send the same RCPT command with the esmtp-keyword SESSION to (C), then
3. (C) would initiate an SMTP transaction with (D) and send the same RCPT command with the esmtp-keyword to (D), then
4. (D) would send its response to (C), which would send the response to (B), which would send the response to (A), then
5. (A) would send its next RCPT command (if sending to multiple recipients), then
6. (A) would indicate it wants to send the message body by sending the DATA (or BDAT if using [[RFC1830](#)]) command, then
7. (B) would send the DATA (or BDAT) command to (C), which would send it to (D), which would send its response code to (C), which is sent to (B), which is sent to (A), then
8. (A) sends its message body to (B), which SHOULD spool it to a local disk while sending it to (C), which SHOULD spool it to a local disk while sending it to (D), which writes it to the local user's mailstore.
9. (A) sends its end of mail data indicator (".") unless using [[RFC1830](#)]), then
10. (B) responds to the end of mail data indicator immediately (and is now responsible for message delivery should it fail after this point), then (B) sends the end of mail data indicator to (C), then
11. (C) responds to the end of mail data indicator immediately (and is now responsible for message delivery should it fail after this point), then (C) sends the end of mail data indicator to (D)
12. (D) responds to the end of mail data indicator when it has finished writing to the user's mailbox.

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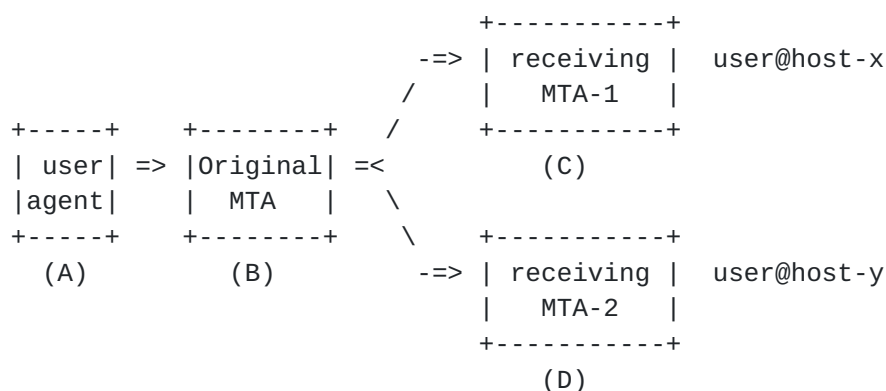
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If there are multiple local recipients and one or more recipients succeeded, but at least one failed, (D) must issue a positive response code to prevent duplicate message delivery [RFC1047]. It MUST generate a bounce message for the failed local recipient(s), and the bounce SHOULD be in the format of a DSN [DSN].

3.3.2. Events - Multiple Remote MTAs

The case where there are multiple remote MTAs is a more complex case than described above, but the same rules apply.



(B) would have to send the appropriate RCPT command with the esmtp-keyword SESSION, the appropriate next-hop MTA (C or D) for each recipient (user@host-x, user@host-y) and echo the responses back to (A).

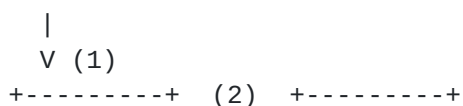
When (A) sends its DATA command, (B) would have to send the DATA command to both MTAs, and reply to (A) if both MTAs have responded positively.

When (A) sends its end of mail data indicator, (B) must respond immediately, and then (B) can send the end of mail data indicator to (C) and (D).

If (B) does not receive a positive (2xx) response from (C) or (D), (B) must queue the message as a normal store and forward message.

3.3.3. State diagram - MTA relay

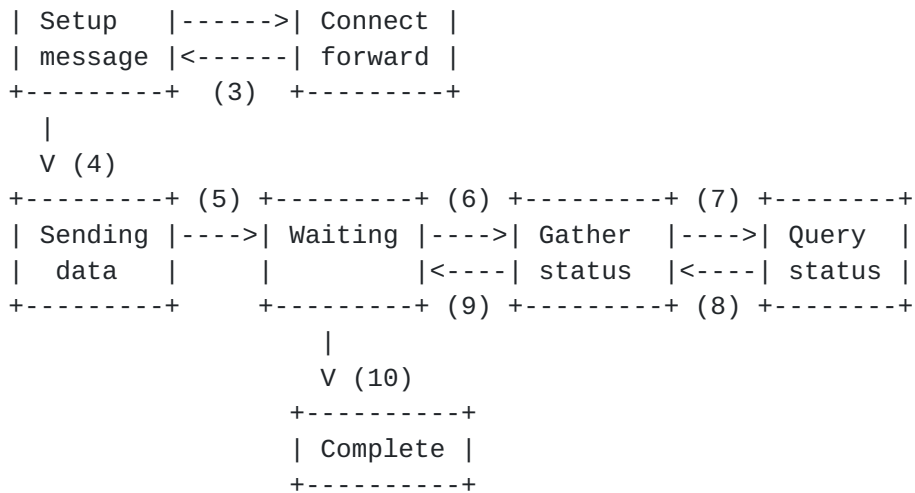
The following state diagram describes the behavior of an MTA relaying Session connection.



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- (1) Event: Incoming MAIL FROM.
Test: -
Action: Prepare to forward message.
- (2) Event: incoming RCPT TO
Test:
Action: IF connection to next-hop server for this message does not already exist then create connection and issue MAIL FROM command. Issue RCPT TO command to next-hop server.
- (3) Event: Response to RCPT TO command.
Test: -
Action: Respond to incoming RCPT TO.
- (4) Event: Incoming DATA/BDAT.
Test: -
Action: Issue DATA/BDAT on forward connections, and forward data as it is received.
- (5) Event: End of data, with confirmation from all downstream MTAs
Test: -
Action: Wait
- (6) Event: Incoming STAT command.
Test: -
Action: Start gathering status - straight to (7)
- (7) Event: -
Test: There are more downstream MTAs to query.
Action: Issue STAT command on next downstream MTA.

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- (8) Event: Response to STAT command.
Test: -
Action: Pass back as response to incoming STAT. If status indicates completion then close the downstream connection.
- (9) Event: -
Test: There are no more downstream MTAs to query.
Action: Wait.
- (10) Event: Incoming RSET, MAIL FROM or SMTP connection broken.
Test: -
Action: Close any remaining downstream connections.

4. New SMTP Verb STAT

One new SMTP verb is introduced with this extension. The STAT verb causes the SMTP server to respond with the Session delivery status of all Session recipients.

An SMTP client MAY send the STAT command if it used the esmtp-keyword SESSION on one of its RCPT commands, but the SMTP client is not required to use the STAT verb. SMTP servers which implement the SESSION extension MUST implement the STAT verb.

The SMTP client MUST NOT send the STAT command unless all of the following are true: (1) the SMTP client sent a RCPT command with the esmtp-keyword SESSION; (2) the SMTP server sent a positive response to that RCPT command; (3) the SMTP client has finished sending the message body and sent the end of mail data indicator (". " or BDAT LAST). If the SMTP client sends the STAT command when not all of the above conditions are met, the SMTP server MUST send a response code of 503.

The syntax of the STAT verb, using the notation described in [\[RFC2234\]](#), is:

```
stat-cmd = "STAT" CR LF
```

4.1. Format of STAT Response

The SMTP server's positive response to the STAT command is a multiline SMTP response. Each line contains information on each Session recipient, in the order specified by the SMTP client.

If the SMTP server is making a negative response to the STAT command the response should be a 5xx response code and follow the normal SMTP rules for multiple line responses. There is no specific format of

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5xx responses.

The syntax of the positive response must be parsable by an SMTP client. Using the notation described in [[RFC2234](#)], the syntax is:

```
stat-response  = *( "250-" [cmd-status SP] resp-line CR LF )
                  "250 " [cmd-status SP] resp-line CR LF

resp-line      = forward-path SP session-status
                  [SP "by=" mta-hostname]

session-status = "delivered" terminal /
                  "in-progress" SP prog-value /
                  "queued" terminal /
                  "failed" terminal

terminal       = SP trans-status [SP trans-id]

trans-status   = "status=" status-code

trans-id       = "trans=" transaction

status-code    = <"status-code" from [RFC1893], with
                  extensions defined in [REPORT-EXTENSIONS]>

prog-value     = sent-count "/" total-count

sent-count     = 1*DIGIT

total-count    = 1*DIGIT

mta-hostname   = *( ALPHA / DIGIT / "." / "-" / "_" )

transaction    = *( ALPHA / DIGIT / "." / "-" / "_" )

cmd-status     = "2.5.0" <only present if SMTP server supports
                  [RFC2034]>

forward-path   = <forward-path as specified in the RCPT command,
                  including "<" and ">" characters>
```

The <session-status> can be spelled in any combination of uppercase and lowercase letters. The meaning of the various values are as follows:

"delivered" Session delivery was successful. Message was delivered to the recipient immediately. This is a terminal value. This can optionally be followed

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with <trans-id>.

- "in-progress" Session delivery has not yet completed. A STAT command issued later will show final status of this message. This is the only non-terminal value. This must be followed by <prog-value>.
- "queued" Session delivery failed for some reason, but the MTA was able to successfully queue the message using normal SMTP store-and-forward. One cause of this status is when the session-enabled server forwards the message to a non-session-enabled server. This is a terminal value. This can optionally be followed with <trans-id>.
- "failed" Delivery failed. The message will be bounced if no DSN was requested, or if a DSN including "NOTIFY=FAILED" was requested [[RFC1891](#)].

<mta-hostname> indicates the host generating the information, and can be used to help trace a message passing along a path of session-aware mailers.

<trans-id> is used to provide the client with a unique transaction number to associate with each delivery. This can be useful for accounting or tracing messages. This number need only be unique for that MTA, it doesn't need to be world-unique.

The two values of the <prog-value> element can be page numbers, byte counts, disk blocks, or any other useful count of the progress of this transaction, as determined by the SMTP server. The values can be displayed by the MUA to the user as-is, or the MUA can use the values to calculate the percentage of completion for presentation to the user. The value of <total-count> is the number of units the SMTP server has received, the value of <sent-count> is the number of units the SMTP server has sent to the next-hop mailer. See example 6.1.

If an SMTP client sends a STAT command and the SMTP server has already informed the SMTP client (in the response to a previous STAT command) that all recipients had terminal values, the SMTP server MAY return a 503 reply.

[4.2.](#) Sequence of Events

The STAT command has a similar sequence of events as described in [section 3.3](#), above.

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Note that the STAT command can only be issued in the same SMTP transaction. There is no provision for an SMTP client to start a new SMTP transaction and query the status of Session delivery for a previous SMTP transaction.

4.3. Timing Considerations

The SMTP server SHOULD respond to a STAT command no later than 60 seconds after a STAT command is received. After 120 seconds an SMTP client MAY assume the connection to the SMTP server is broken.

To prevent excessive network activity by an SMTP client querying delivery status "too often", the SMTP server may delay responding to a client's STAT command. Such a delay MUST NOT exceed 10 seconds.

Due to the delays inherent in establishing connections with each MTA in the SMTP "path", SMTP servers that implement the Session extension SHOULD also implement [[RFC2197](#)], and SMTP clients SHOULD use pipelining if available.

5. Security Considerations

This section describes new security vulnerabilities that are introduced with this SMTP extension. Security vulnerabilities that are inherent to SMTP itself are not described.

5.1. Denial of Service

As Session consumes more resources on MTAs, denial of service attacks against MTAs may be more effective.

XXX - more verbage

5.2. Abuse of Immediate Delivery

This is some concern that users will always choose the 'deliver immediately' button or mailer option in their MUA. As immediate delivery requires more resources on MTAs, this is indeed a concern.

To alleviate such concerns, ISPs could charge extra for immediate delivery involving their mailers, offering immediate delivery as a value-add service, not accept Session messages during periods of high usage, or limit the total number of Session connections or the number of Session connections to/from certain hosts or domains.

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6. Examples

In examples, "C:" and "S:" indicate lines sent by the client and server respectively. If such lines are wrapped without a new "C:" or "S:" label, then the wrapping is for editorial clarity and is not part of the command.

6.1. Successful Session Delivery to Two Recipients

This example shows a successful Session delivery with two recipients. The first recipient, bill@fuggles.com, was still being queued when the first STAT command was sent by the client, but a subsequent STAT command shows the final status.

```
S: 220 mailer.cisco.com ESMTP service ready
C: EHLO pc.cisco.com
S: 250-mailer.cisco.com says hello
S: 250 SESSION
C: MAIL FROM:<dwing@cisco.com>
S: 250 <dwing@cisco.com> Sender ok
C: RCPT TO:<bill@fuggles.com> SESSION
S: 250 <bill@fuggles.com> and options ok
C: RCPT TO:<njoffe@cisco.com> SESSION
S: 250 <njoffe@cisco.com> and options ok
C: DATA
S: 354 Enter your data
C: From: Dan Wing <dwing@cisco.com>
C: To: njoffe@cisco.com, bill@fuggles.com
C: Date: Mon, 6 Oct 1997 12:42:32 -0700
C: Subject: Palo Alto Coffee shops
C:
C: What is a good coffee shop in Palo Alto?
C: .
S: 250 message accepted
C: STAT
S: 250-<bill@fuggles.com> in-progress 5/184 by=fwall.cisco.com
S: 250 <njoffe@cisco.com> delivered by=popstore.cisco.com
trans=E23132
C: STAT
S: 250-<bill@fuggles.com> in-progress 43/50 by=example.com
S: 250 <njoffe@cisco.com> delivered by=popstore.cisco.com
trans=E23132
C: STAT
S: 250-<bill@fuggles.com> delivered by=mailer.fuggles.com
S: 250 <njoffe@cisco.com> delivered by=popstore.cisco.com
trans=E23132
C: QUIT
S: 221 Goodbye
```


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(The string "trans=E23132" is shown on a separate line in this example for clarity. The string would appear on one line.

6.2. Unsuccessful Session Delivery

This example shows the client wanted to send the message immediately, and the server responded with a "250" (indicating it believed the message could be sent immediately), but a problem occurred forcing the mailer at peas.com to deliver the message using store-and-forward.

```
S: 220 mailer.cisco.com ESMTP service ready
C: EHLO pc.cisco.com
S: 250-mailer.cisco.com says hello
S: 250 SESSION
C: MAIL FROM:<dwing@cisco.com>
S: 250 <dwing@cisco.com> Sender ok
C: RCPT TO:<greengiant@peas.com> SESSION
S: 250 <greengiant@peas.com> and options ok
C: DATA
S: 354 Enter your data
C: From: Dan Wing <dwing@cisco.com>
C: To: "Jolly" <greengiant@peas.com>
C: Date: Mon, 6 Oct 1997 12:42:32 -0700
C: Subject: Veggies
C:
C: Veggies are good for you, but from a can?
C: .
S: 250 message accepted
C: STAT
S: 250 <greengiant@peas.com> queued by=peas.com
C: QUIT
S: 221 Goodbye
```

6.3. SMTP Client Disconnects Before Sending STAT

The SMTP client is not required to query the success/failure of immediate message delivery. The following transaction is legal.

```
S: 220 mailer.cisco.com ESMTP service ready
C: EHLO pc.cisco.com
S: 250-mailer.cisco.com says hello
S: 250 SESSION
C: MAIL FROM:<dwing@cisco.com>
S: 250 <dwing@cisco.com> Sender ok
C: RCPT TO:<masinter@parc.xerox.com> SESSION
S: 250 <masinter@parc.xerox.com> and options ok
```

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```
C: DATA
S: 354 Enter your data
C: From: Dan Wing <dwing@cisco.com>
C: To: masinter@parc.xerox.com
C: Date: Mon, 6 Oct 1997 12:42:32 -0700
C: Subject: Palo Alto Coffee shops
C:
C: How does this look?
C: .
S: 250 message accepted
C: QUIT
S: 221 Goodbye
```

7. Acknowledgments

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((others?))

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