

# Performance Testing

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## Initial Testing Setup

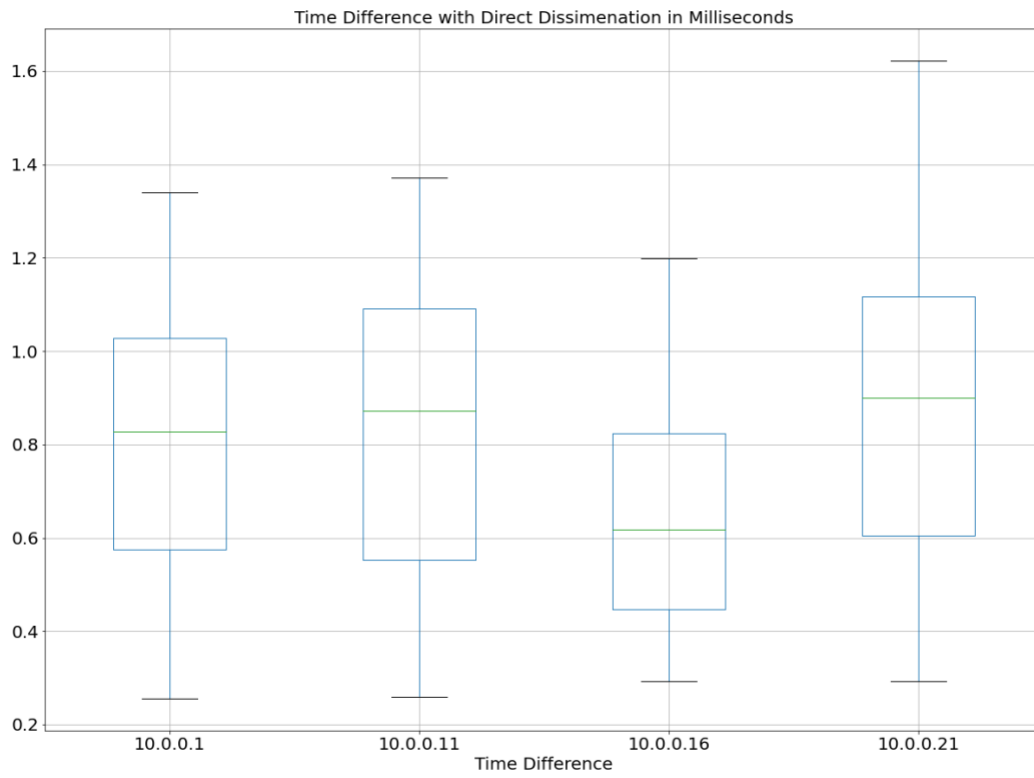
The testing is conducted with a mininet tree topology of fanout 3 and depth 3, so in total there are 27 hosts:

- Host 13 is chosen as the broker.
- Host 1, 11, 16, and 21 are chosen as the publisher.
- Host 2, 4, 17, 19 are chosen as the subscriber.

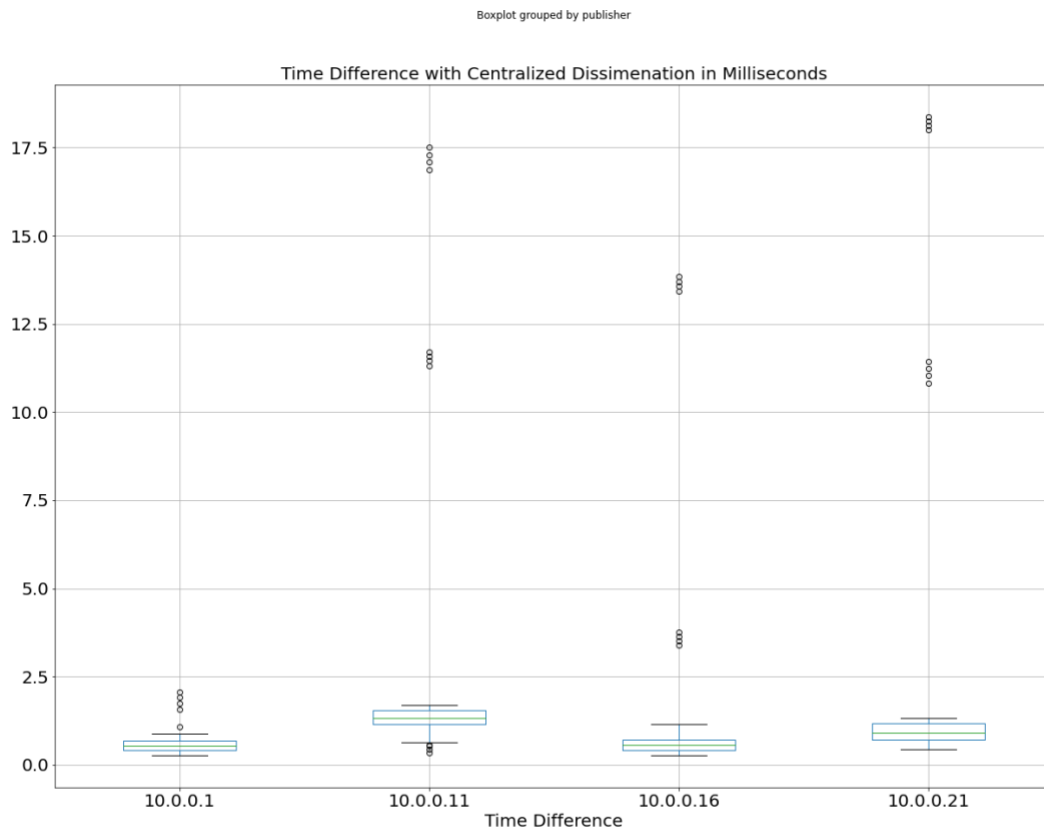
The same set of broker, publisher, and subscriber are tested with the centralized dissemination and direct dissemination. For each publisher, the logs from the subscribers are analyzed to study the time difference between the time when the message is disseminated from the publisher and that when the message is received by the subscriber.

## Direct Dissemination: Comparison across publishers

Boxplot grouped by publisher

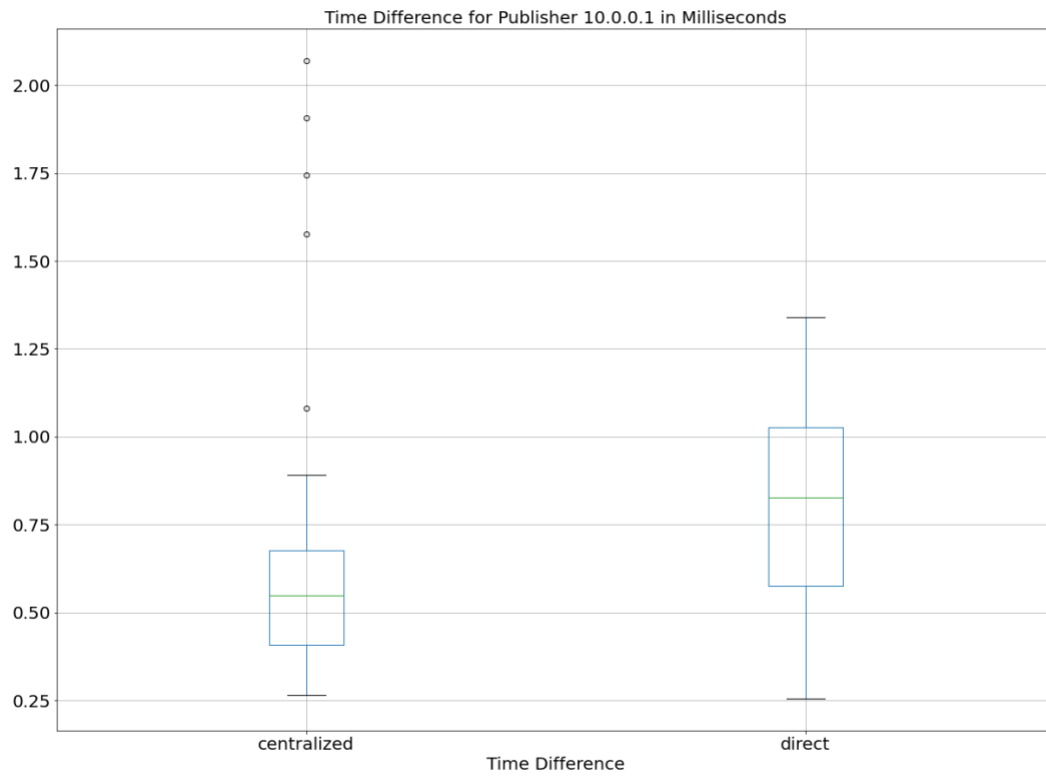


## Central Dissemination: Comparison across publishers

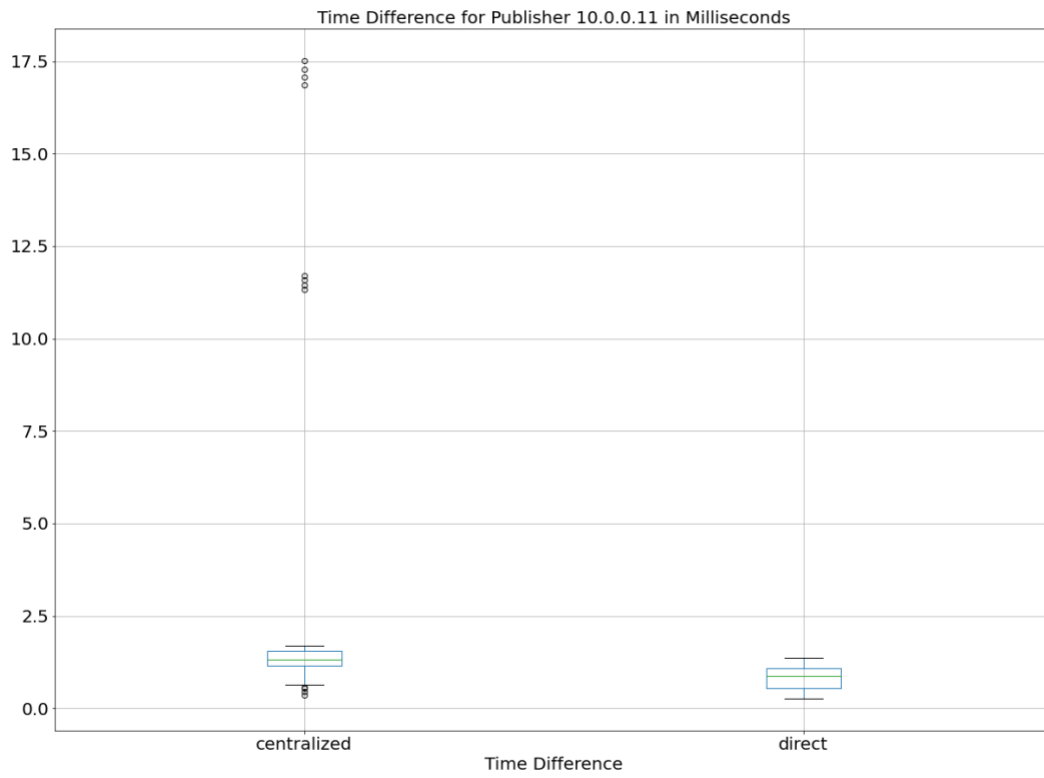


Each Publisher: Comparison between direct and centralized dissemination

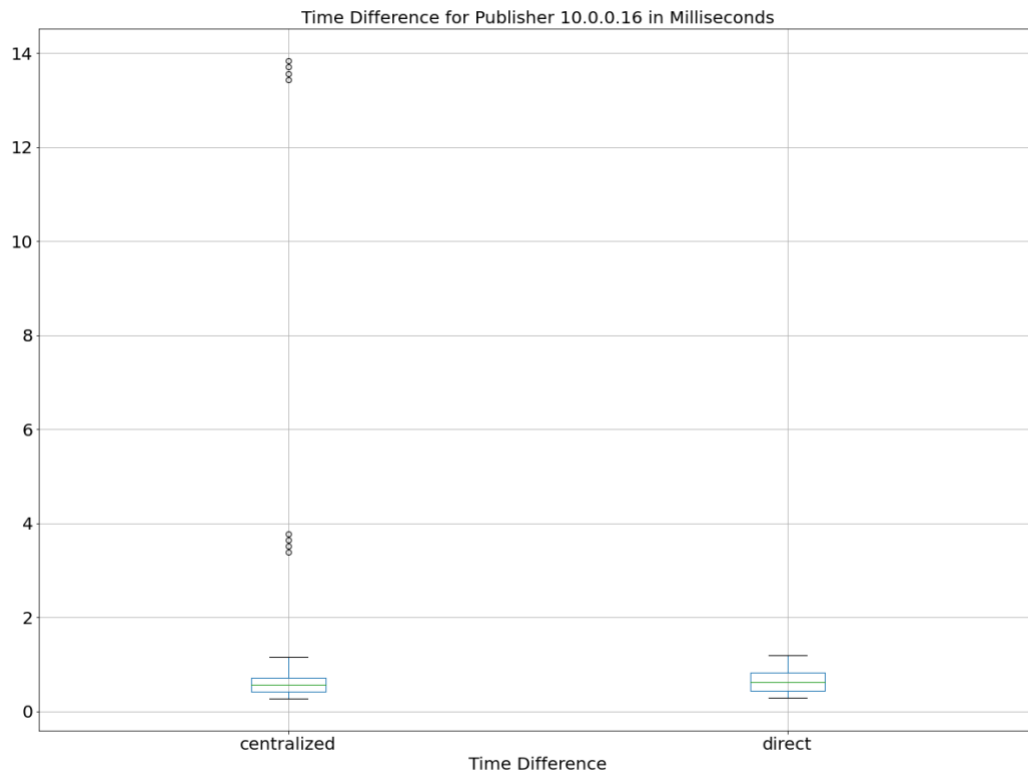
Boxplot grouped by type

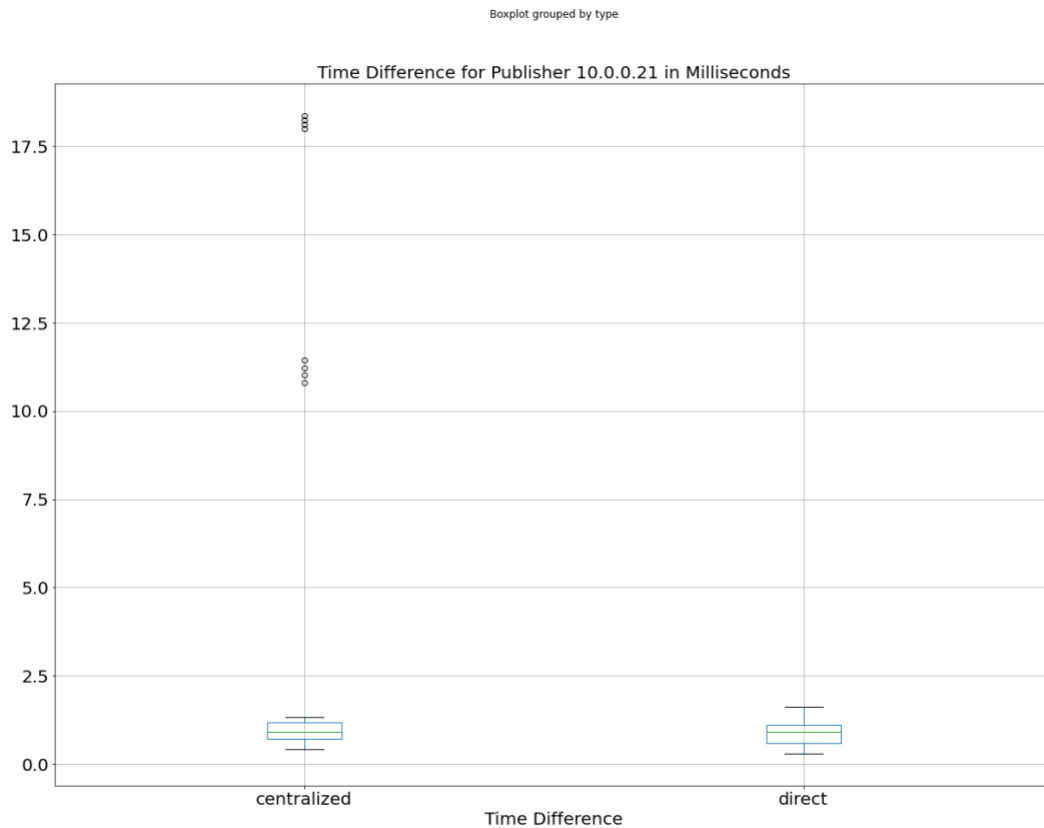


Boxplot grouped by type



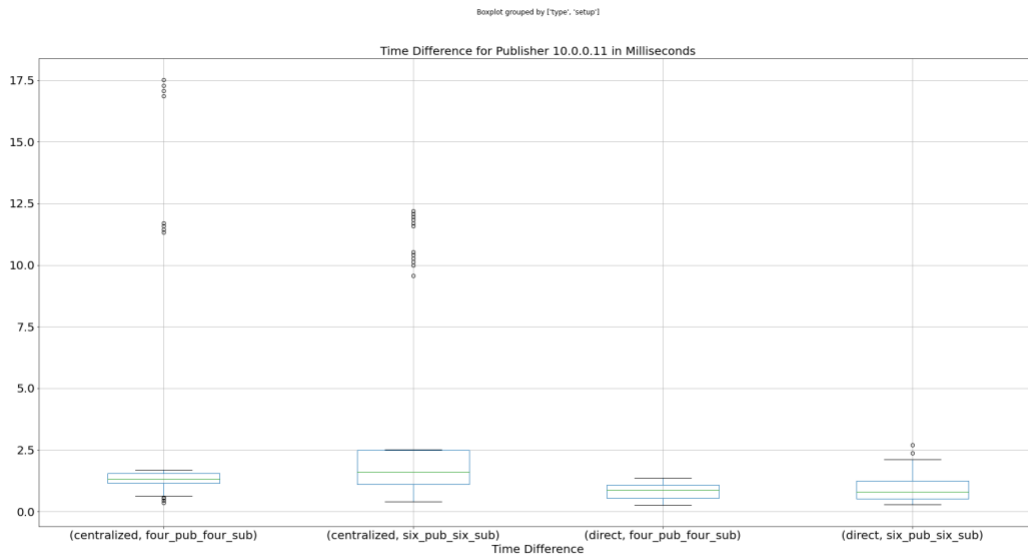
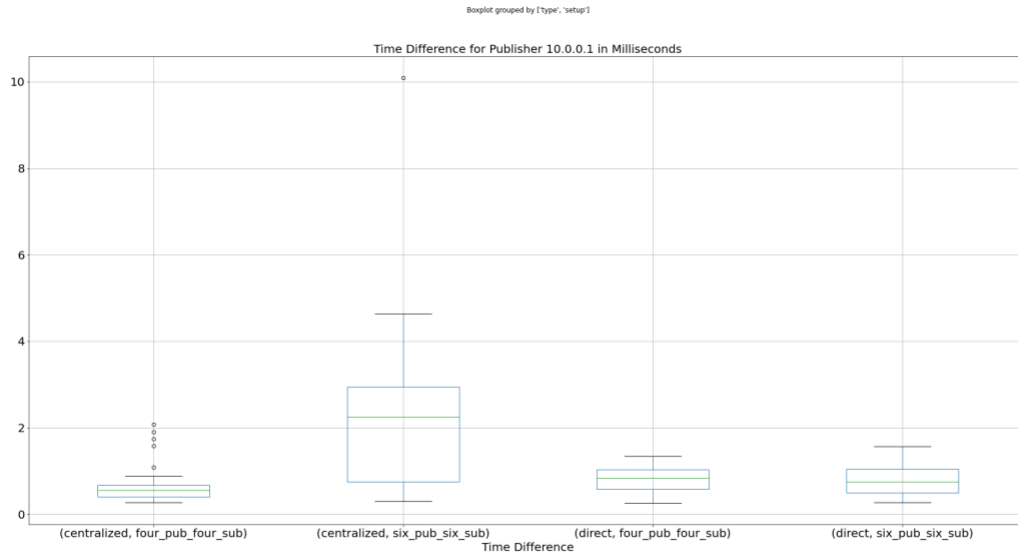
Boxplot grouped by type



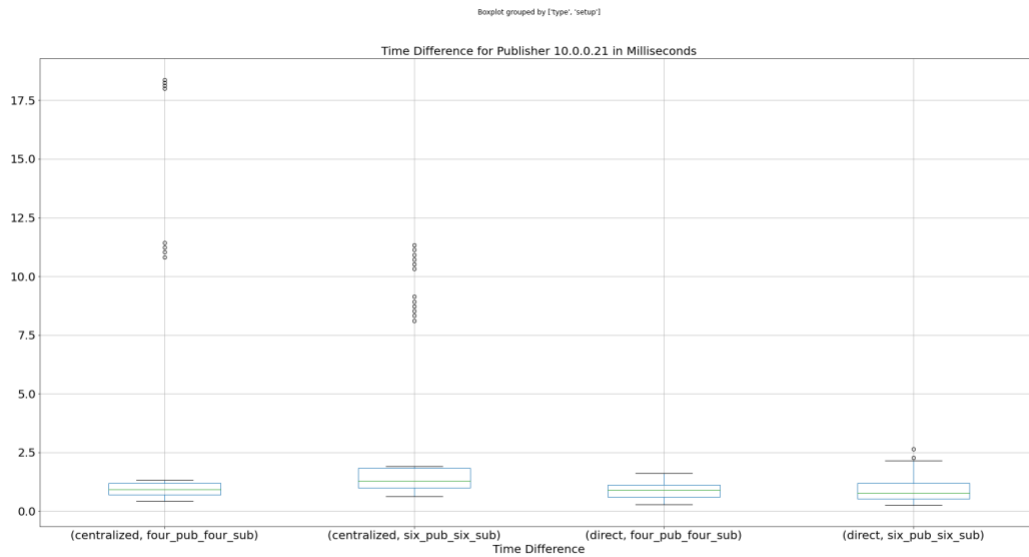
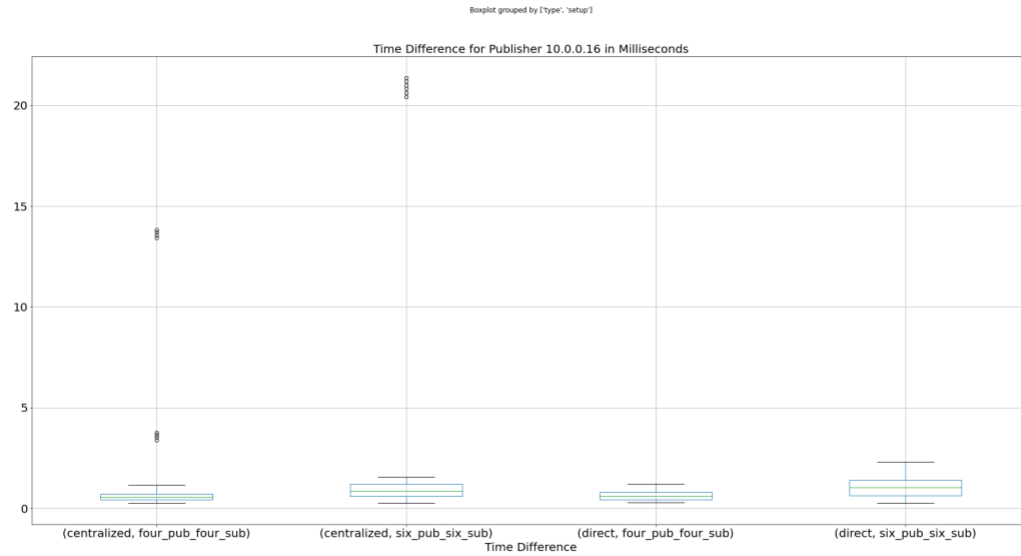


## Additional Testing Setup

To test the impact of number of publisher and subscriber on the performance, Host 8 and Host 26 are added as publishers, and Host 10 and Host 27 are added as subscriber. Since Host 1, 11, 16, and 21 are common publishers in both setting, their performance are compared in each setting to evaluate the impact of number of publisher and subscriber.







## Observations

The following observations can be drawn from our testing:

1. The latency with direct dissemination is in general smaller than that with centralized dissemination.
2. The distribution of latency for direct dissemination is more uniform distributed without outlier, while there are extra large latency with centralized dissemination
3. With the increase number of publishers and subscribers, the latency increases for both direct and centralized dissemination.

4. The impact of increased number of publishers and subscribers on centralized dissemination is larger than that on direct dissemination.
5. The relationship between the increase of latency and the increase of publishers/subscribers are non-linear. It seems to be a quadratic relationship (more study is needed to confirm). When initially tested with 13 subscribers and 13 publishers, the test did not complete within the time limit. Especially for centralized dissemination, only a few messages are delivered within the time limit.