

Characterization of ROS2 rclcpp communication

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Introduction

This use the same benchmarking test explained in the doc:

https://docs.google.com/document/d/1YRpWajYvXF_RA7nIH3Qe8RFUyVJwJoxVTSpQFJKN18U/edit#heading=h.pk0vgditottx

In this document, a summary of the results with the changes introduced in the PR [here](#) is detailed. For running the characterization tests, the following branches should be merged.:

- ivanpauno/skip-interprocess-publish-when-possible-follow-up
- ivanpauno/rclcpp-performance

Environment

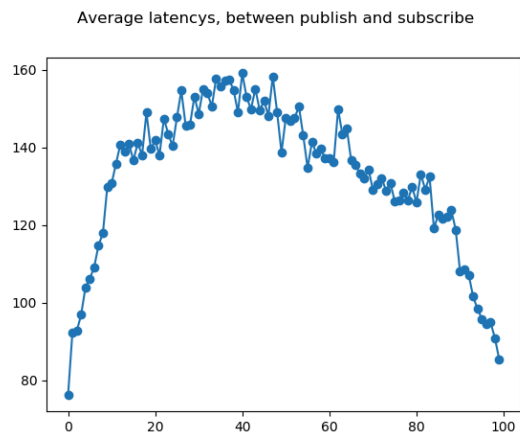
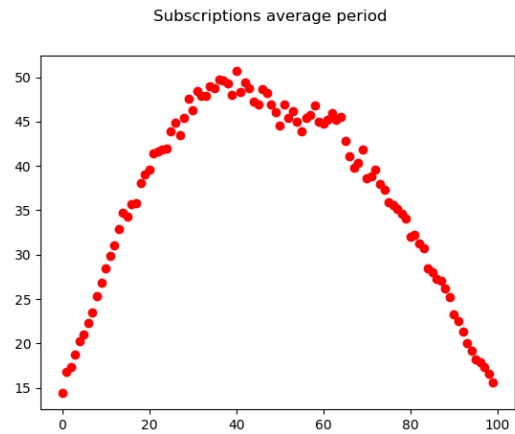
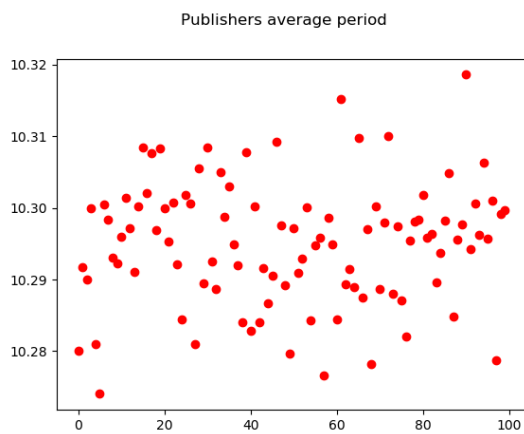
- Operative system: Ubuntu Bionic Beaver 18.04 (64-bit)
- DDS: FastRTPS
- Branch: ivanpauno/skip-interprocess-publish-when-possible-follow-up
- Rclcpp commit hash: 10bb55f1b71f2a85e3ad2b3f1e22b956744577e9
- Processor: Intel® Core™ i7-4600U CPU @ 2.10GHz × 4
- Memory: 7,7 GiB

Test with 100 publishers/subscriptions

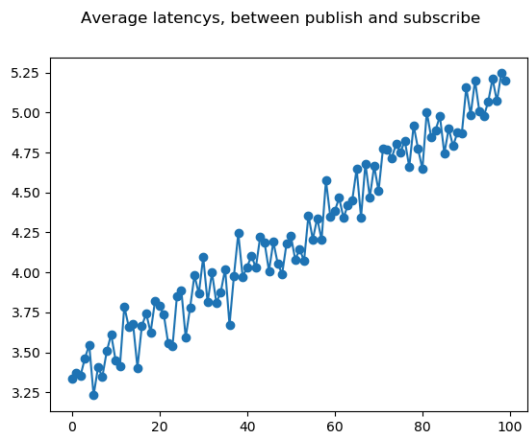
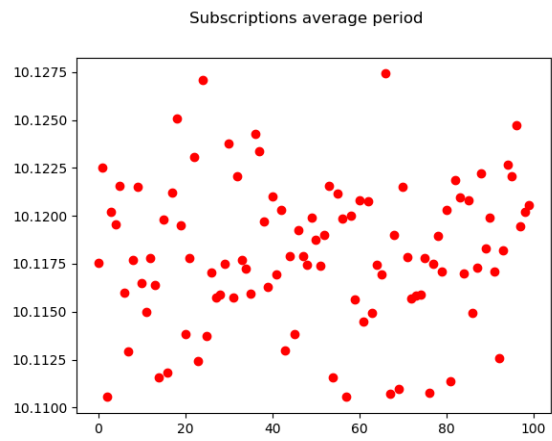
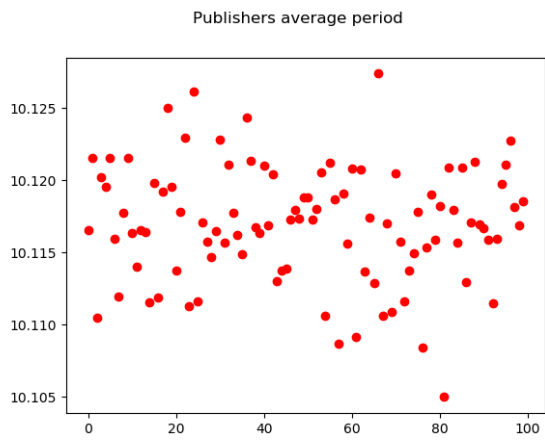
Other configs.: 10ms period, 10000 messages published, length 100000 bytes.

Tests using shared_ptr publish

Interprocess



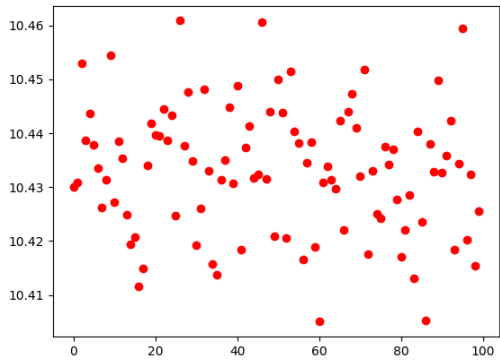
Intraprocess



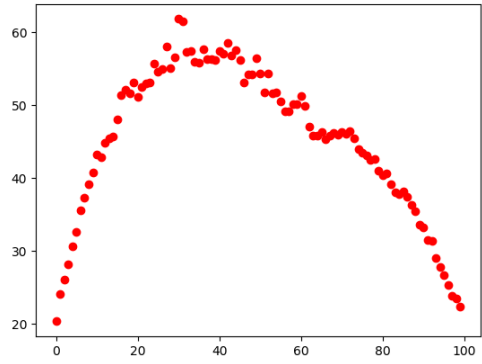
Tests using unique_ptr publish

Interprocess

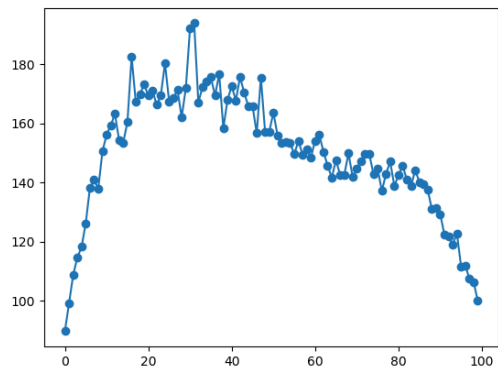
Publishers average period



Subscriptions average period

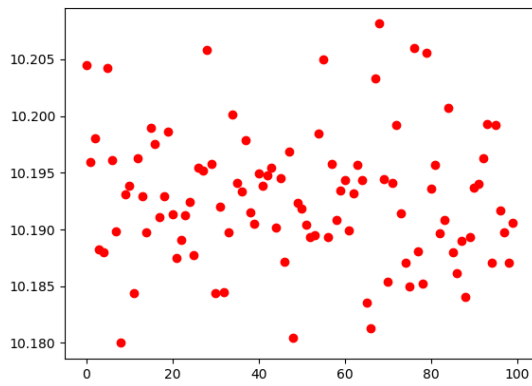


Average latencies, between publish and subscribe

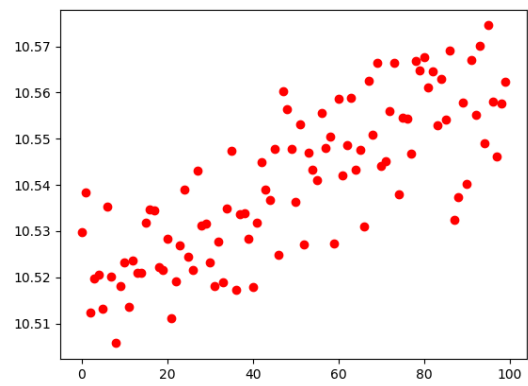


Intraprocess

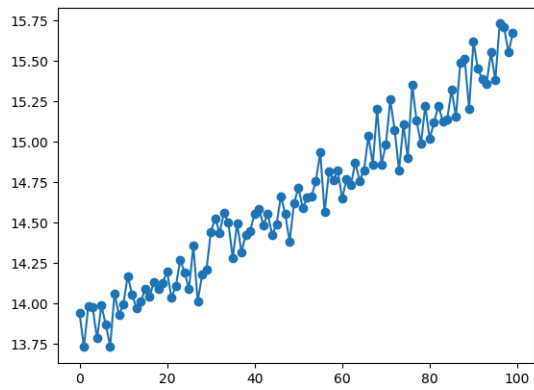
Publishers average period



Subscriptions average period



Average latencies, between publish and subscribe

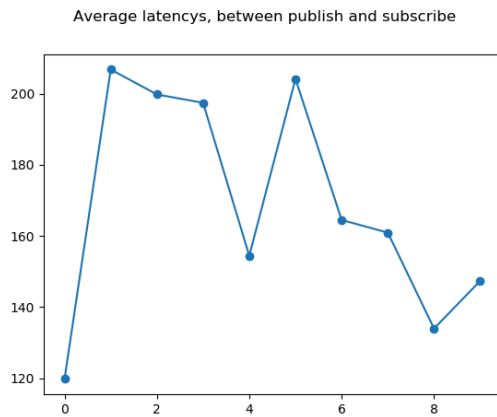
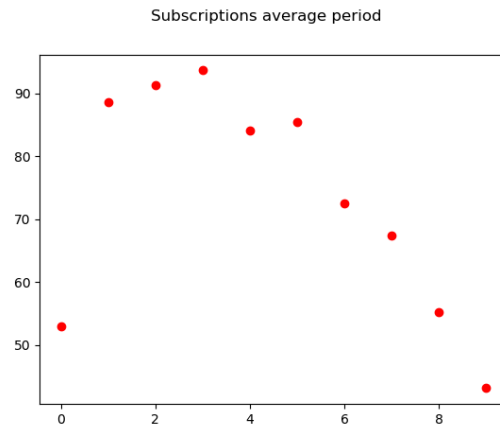
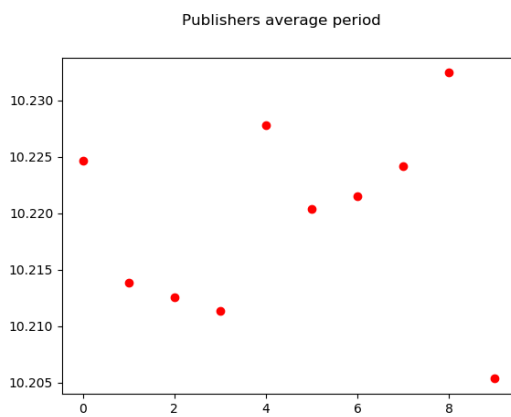


Test with 10 publishers/subscriptions, 1M bytes

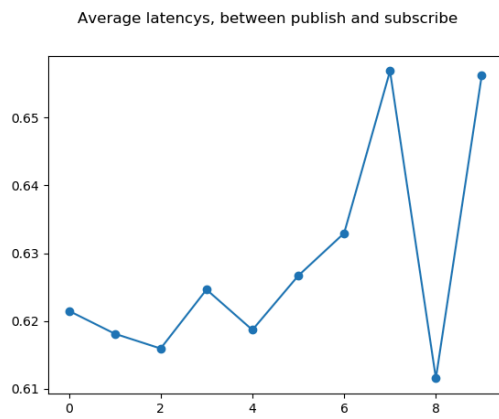
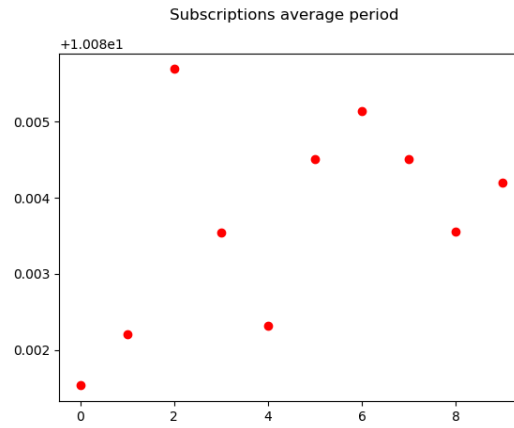
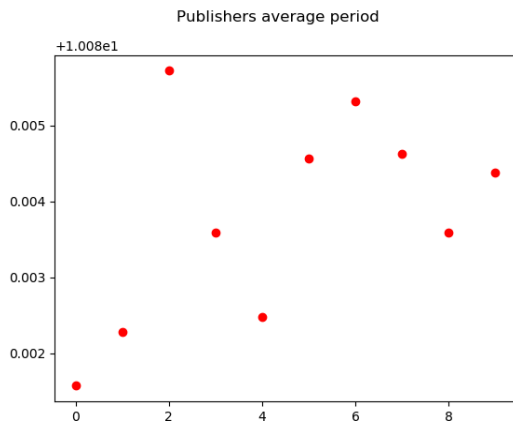
Other configs.: 10ms period, 10000 messages published, length 1000000 bytes.

Tests using shared_ptr publish

Interprocess



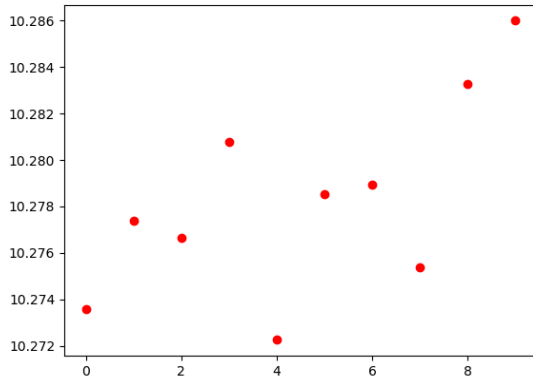
Intraprocess



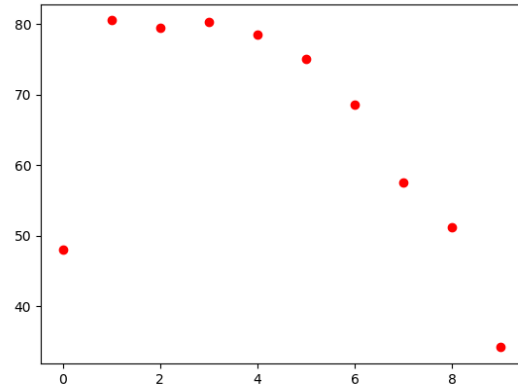
Tests using unique_ptr publish

Interprocess

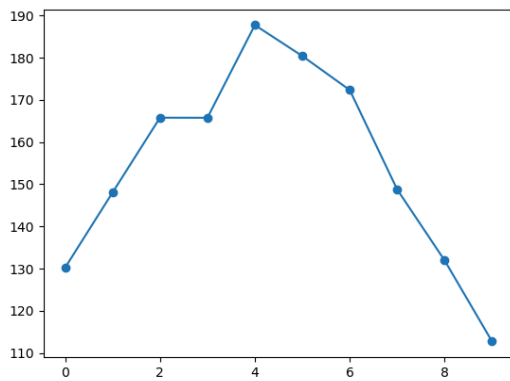
Publishers average period



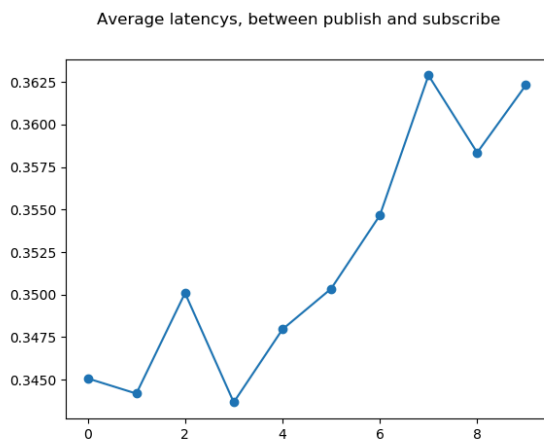
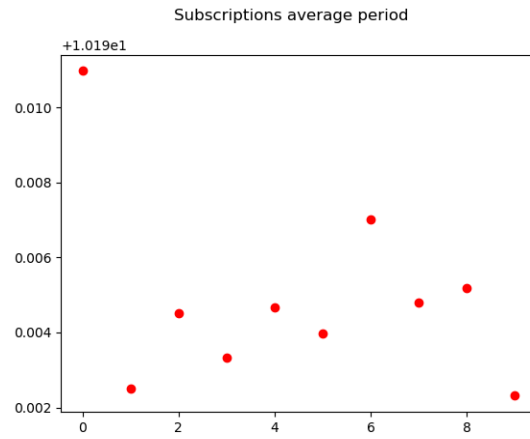
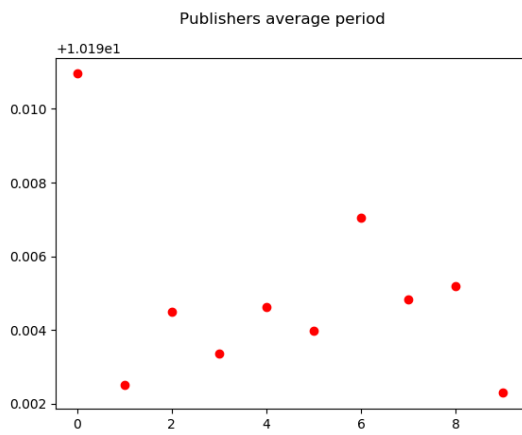
Subscriptions average period



Average latencies, between publish and subscribe



Intraprocess



Test with 1 publisher/subscription, 10M bytes sent

Other confs.: 10ms period, 10000 messages sent, 10000000 bytes length.

	Shared Inter	Shared Intra	Unique Inter	Unique Intra
Pub period (ms)	16.8	10.1	17.8	11.4
Sub period (ms)	40.5	10.1	40.5	11.4
Latency (ms)	178	2.4	185	0.51

Conclusions

The results obtained shows a notable improvement in publish-to-subscription-latency when only having intraprocess subscriptions, as expected. The results are similar to the “Shared Skipped Inter” results in the previous document, which was the idea.