



Independent report on load test results for 3CX's WebMeeting SFU



Introduction:

Following its scientific publication of [Comparative Study of WebRTC Open Source SFUs for Video Conferencing](#), CoSMo Software Consulting Pte Ltd ("CoSMo") has been approached by 3CX Ltd ("3CX") to assist with the load testing of 3CX's SFU.

This report intends to describe the methodology used and results of the load testing for 3CX's SFU. The tests began at the beginning of February and were concluded at the end of April 2019.

Methodology:

For this load testing, CoSMo followed the same methodology as the one used for the comparative study referred to above, summarised below.

CoSMo implemented a test script and provided 3CX with access to KITE Grid Manager. KITE Grid Manager launches the virtual machines necessary to simulate the required number of clients, and execute the following test script for each client:

- open Chrome,
- join a meeting room or a webinar session on 3CX SFU,
- perform video and statistics check, and
- output a report summary.

Once the load target is reached, the test script would either leave the participants in the meeting room or randomly disconnect and reconnect them to simulate real-life video conferences where users join and leave meetings.

In addition, CoSMo provided 3CX with a getStats client SDK to collect data from all the clients and retribute them into the KITE Kibana dashboard, which allows visualisation of relevant statistics on charts.

Scenarios and target loads:

3CX has tested two scenarios:

- video conference: 66 meeting rooms with each 7 participants (total 462 clients)
- webinar: 12 publisher/presenters streaming audio and video to 250 viewers each (total 3000 clients)

The two scenarios were tested separately (at different timing), but also simultaneously.



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Results:

While the tests were done by 3CX, CoSMo was very much involved in order to monitor the KITE Grid Manager system and provide technical support to 3CX. CoSMo has therefore been able to witness the performance of 3CX's WebMeeting platform via the test results.

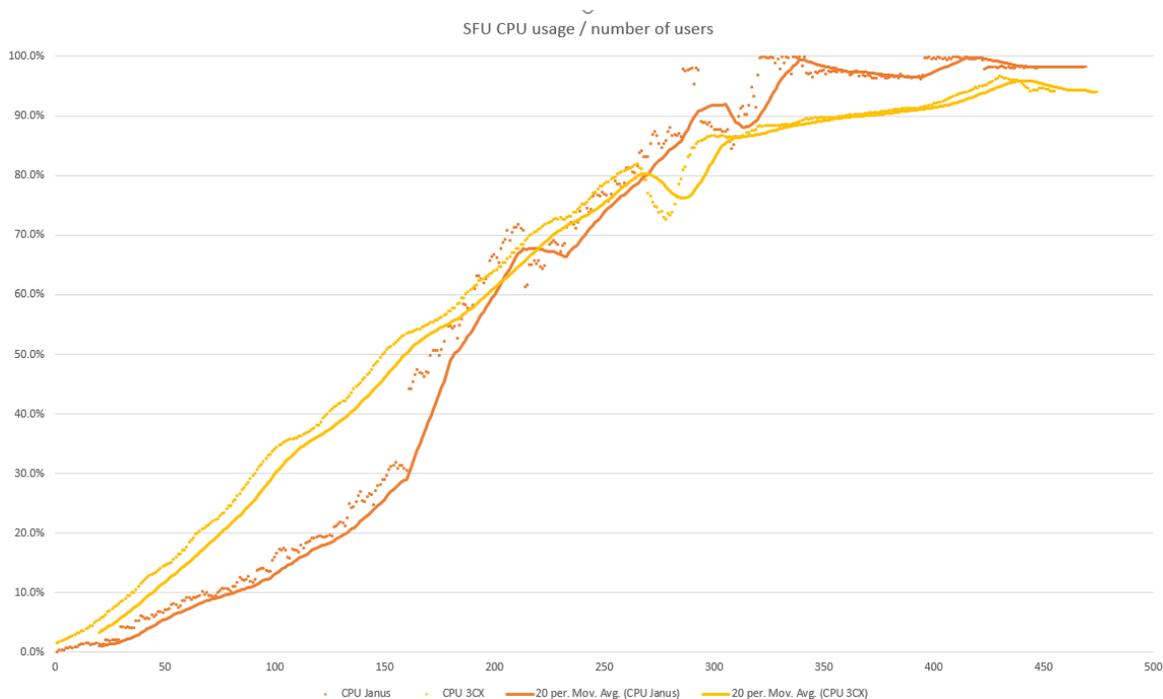
3CX's WebMeeting platform proved to be stable. With the production settings, at no point during the many tests did the platform hang or crash.

From the statistics collected, the platform performed exceptionally well under heavy loads and long test durations:

- RTT remained consistently low at an average of 3ms
- Packet loss was negligible below 0.1%
- The in and out bitrates for all video and audio tracks were stable
- Audio jitter was negligible below 0.007%

We did notice an anomaly with the frame rate, which slowly dropped after 4 hours of meeting. After investigation, 3CX found that this was due to the AngularJS web app and not caused by the WebMeeting backend platform. The issue was resolved by using a simpler web client.

To understand how 3CX SFU performed relatively to the open-source SFUs tested for CoSMo's scientific publication, we have repeated the same test with the exact same setup. The SFU was running on an AWS c4.4xlarge instance and the clients were launched at the same rate. All bandwidth optimizations settings on 3CX SFU were disabled to ensure a fair comparison. The CPU utilization/number of users charts are very similar.



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