experiment

October 10, 2024

1 Test BBRv3 patches

The goal of this experiment is to test the improvement from BBRv1 to BBRv3.

1.1 Experimental environment

1.1.1 Hardware environment

BBRv3 will be tested on Azure using `Standard_D2s_v5` node. There will two VMs located in eastus2 and westeurope and connected each other through virtual network.

1.1.2 Software environment

The Azure node runs Mariner in the following version:

```
NAME="Microsoft Azure Linux"
VERSION="3.0.20240727"
ID=azurelinux
VERSION_ID="3.0"
PRETTY_NAME="Microsoft Azure Linux 3.0"
ANSI_COLOR="1;34"
HOME_URL="https://aka.ms/azurelinux"
BUG_REPORT_URL="https://aka.ms/azurelinux"
SUPPORT_URL="https://aka.ms/azurelinux"
```

The kernel with BBRv3, *i.e.* `6.6.35.1-5.azl3.bbr3+`, patches need to be `kexec`'ed to be run, details are available in the experiment script. Then, the network subsystem is configured as follow:

```
net.core.rmem_max = 2147483647
net.core.wmem_max = 2147483647
net.ipv4.tcp_rmem = "4096 67108864 1073741824"
net.ipv4.tcp_wmem = "4096 67108864 1073741824"
net.core.default_qdisc = fq_codel
```

1.2 Experimental protocol

We will measure the performance of BBRv3, BBRv1 and CUBIC. For each of this algorithm, we will run the following command 30 times:

```
iperf3 --format m --version4 --client $server_ip --port 5201 --time 30 --parallel 1 --congestio
```
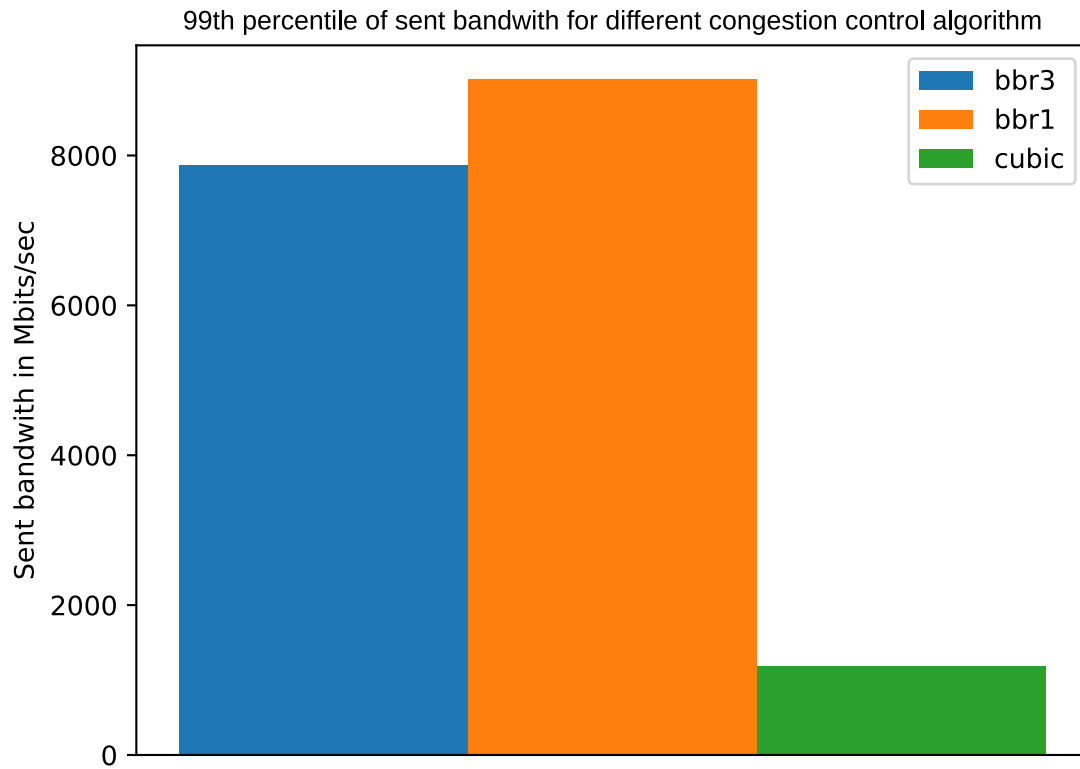
We will measure the bandwith, in Mbit/sec, and the number of retransmitted packets, from the sender point of view.
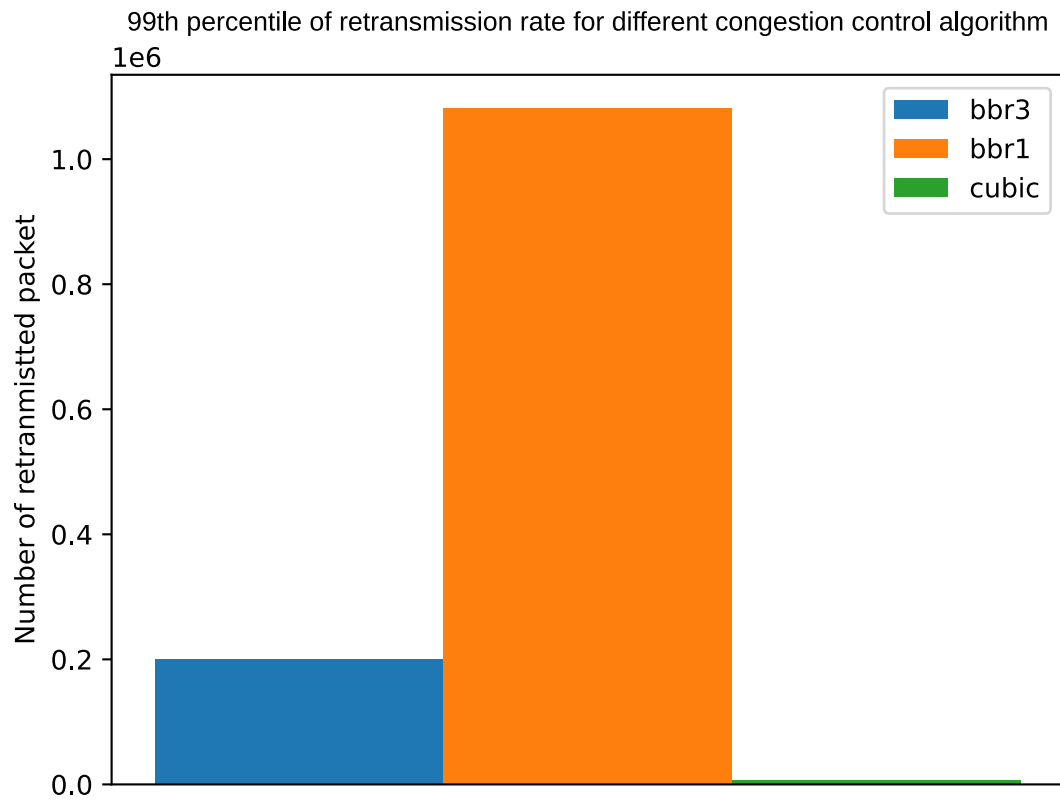
1.3 Hypothesis

BBRv3 should offer almost the same performance as BBRv1 but with less retransmission.

1.4 Results

Let's compute the 99th percentile of bandwith and retransmisted packets for each algorithm:

99th percentile of sent bandwith for different congestion control algorithm

99th percentile of retransmission rate for different congestion control algorithm

1.5   Conclusion

As expected, BBRv3 reduces the retransmission rate by more than 5 while reducing the bandwith by less than 15%.