

# Fq\_codel

## fq\_codel

In 2012, Eric Dumazet contributed the `fq_codel` queueing discipline to the Linux kernel. It is thus available in recent Linux versions (3.5 and later). It combines CoDel with a variant (Deficit Round Robin) of stochastic flow-based fair queueing, and some logic to the effect that new flows get priority over old ones. It also enables ECN by default, has low computational and memory (64 bytes per flow) overhead, and can be used even on 10Gb/s links with contemporary hardware.

## How to Use

For a simple device *your\_device*, `fq_codel` can be activated simply by saying (as root):

```
tc qdisc add dev your_device root fq_codel
```

Unfortunately some devices are not that simple, e.g. Wifi interfaces have more than one queue, and `fq_codel` would have to be attached to each of them. Dave Täht has written a `debloat` script that should work for any type of interface. Hopefully, future releases of GNU/Linux distributions will be enhanced to set it up automatically by default for all devices on which it makes sense. (Source: [Message by D. Taht to the LWN mailing list](#), June 2012.)

## Contributed Packages for Debian/Ubuntu and Arch Linux

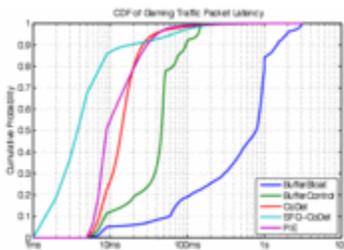
Toke Høiland-Jørgensen has provided packages of `iproute2`, `debloat`, `netperf` and `netperf-wrapper` with support for `fq_codel` for recent releases of Debian, Ubuntu and Arch GNU/Linux on <http://archive.tohojo.dk/>.

## Performance Evaluation Results

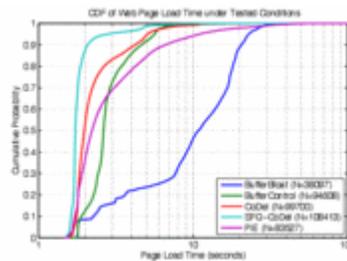
The following graphs illustrate the effect of `fq_codel` compared to conventional FIFO (tail-drop) queueing with large buffers, and also compared to other mechanisms such as PIE.

### Simulation Study for DOCSIS Cable Modems

These two CDF plots are from an IETF-86 presentation by Greg White (CableLabs) of NS-2 simulations of DOCSIS 3.0 cable modems with different queueing mechanisms under different simulated workloads.



CDF of Gaming Traffic Packet Latency,



CDF of Web Page

Load Time (courtesy Greg White)

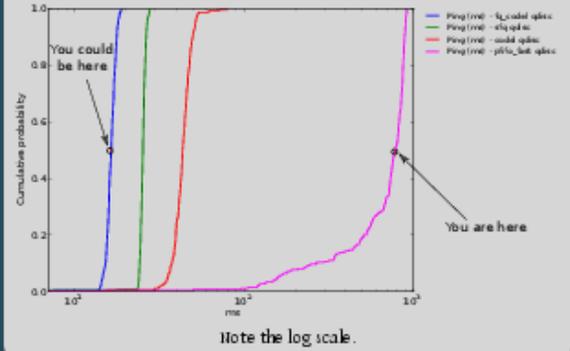
## Measurements on Dedicated Lab Network

Toke Høiland-Jørgensen from the University of Roskilde performed comparative measurements of CoDel, `fq_codel`, traditional Linux SFQ and the default FIFO queueing on a dedicated network of workstations connected by Ethernet. Toke implemented a new "RRUL" (Realtime Response Under Load) test, which is implemented as a Python wrapper around the `netperf` benchmarking tool, and is distributed as part of the `netperf-wrapper` package. The results were also presented at IETF-86. The summary/spoiler slide again clearly shows the benefits of `fq_codel` over previous methods.

## Spoiler

### Effects of bufferbloat mitigation - RRUL test

Latency during four TCP streams in each direction.



(slides)

The data underlying this presentation is available on <http://akira.ruc.dk/~tohojo/bufferbloat/>.

## References

- [PATCH net-next] fq\_codel: Fair Queue Codel AQM, E. Dumazet, Message to the Linux netdev mailing list, May 2012
- Codel page on Bufferbloat Wiki
- The State of the Art in Bufferbloat Testing and Reduction on Linux, T. Høiland-Jørgensen, presentation to IRTF ICCRG at IETF-86, Orlando, FL, March 2013
- Simulation Study of AQM Performance in DOCSIS 3.0, G. White, presentation to IRTF ICCRG at IETF-86, Orlando, FL, March 2013
- draft-ietf-aqm-fq-codel-06, *The FlowQueue-CoDel Packet Scheduler and Active Queue Management Algorithm*, Toke Høiland-Jørgensen, Paul McKenney, Dave Täht, Jim Gettys, Eric Dumazet, March 2016

– Main.SimonLeinen - 2013-03-30 - 2016-03-20