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Bufferbloat, now in the WLAN Pros Toolbox

By **Keith Parsons, CWNE #3** · 2026-10-09 · originally on LinkedIn



BUFFERBLOAT · LATENCY UNDER LOAD

The number a speed test hides

A speed test loads the link and posts a great throughput figure. At that same instant, round-trip latency climbs from single-digit to hundreds of milliseconds and the connection becomes unusable. One link, one moment, two very different stories.



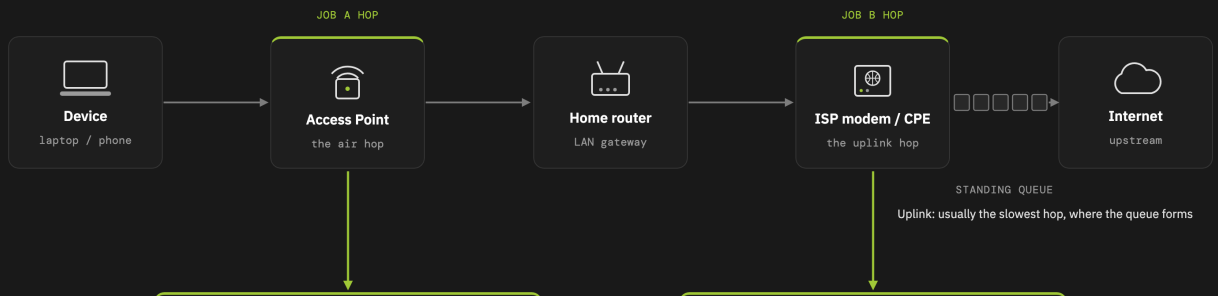
Illustrative shape, not a captured measurement. The point is the **relative** rise in latency under load, not any single millisecond value.

WLAN Pros

BUFFERBLOAT · REMEDIATION

Two separate jobs, two different hops

Shaping the WAN uplink and fixing the air are different fixes on different devices. The standing queue that classic bufferbloat is famous for usually forms at the ISP uplink, not at the Access Point. Do not conflate the two.



JOB A: WI-FI AIR
at the Access Point hop

Fix the air

- `fq_codel` for `mac80211`, built for the wireless stack
- AP-side airtime fairness, needs no client changes
- Targets Wi-Fi's own bloat: aggregation, retries, shared airtime

Høiland-Jørgensen, Kazior, Täht et al., "Ending the Anomaly," USENIX ATC '17

≠ SEPARATE

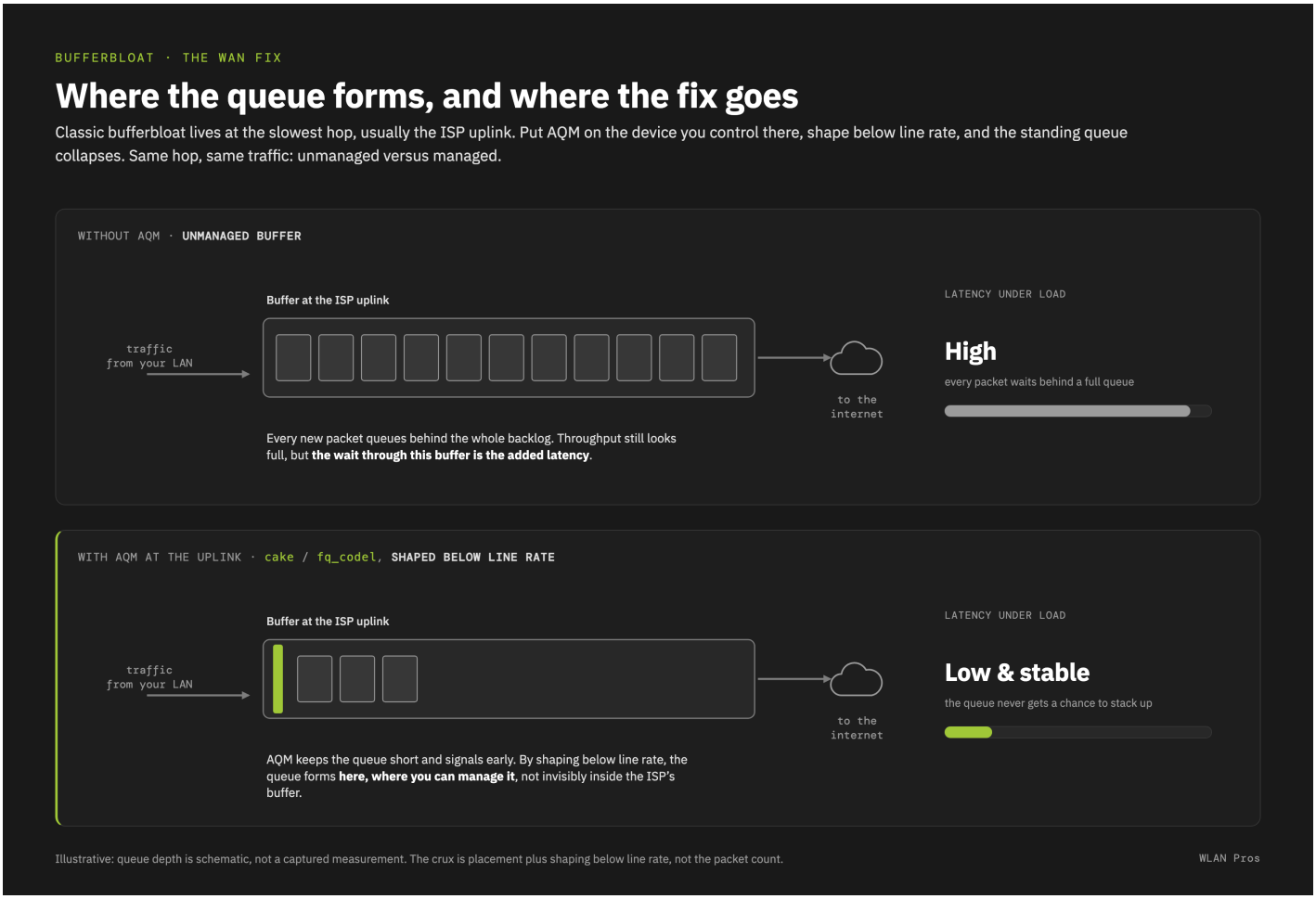
JOB B: WAN UPLINK
at the ISP modem / CPE hop

Shape the uplink

- `cake` or `fq_codel` as SQM, on the device you control
- Shaped **below** measured line rate, so the queue forms where AQM can manage it
- This hop is the classic bufferbloat bottleneck

Enabling `fq_codel` in the wrong place, or without shaping, changes nothing

Different hops. Different fixes. Do not conflate them.
Shaping the WAN never touches the air, and fixing the air never shapes the uplink.



Your speed test says the connection is great. Your users say the video call froze. You are probably both right.

That gap has a name: bufferbloat. A buffer somewhere in the path holds far more data than it should. Load the link and that buffer fills into a standing queue, so every packet waits its turn. Throughput stays high while latency climbs, and a speed test only reports the throughput.

The latest WLAN Pros Toolbox adds three Educational Resources on it:

Bufferbloat: Latency Under Load. What it is, why the fix belongs at the real bottleneck and not at the Access Point, and why fixing the air and fixing the uplink are two separate jobs.

The LibreQoS Bufferbloat Test. It takes an idle baseline, loads the download, the upload, then both, and grades each on how far latency rose. Its advanced page breaks the delay into parts following the Broadband Forum's Quality Attenuation work.

The Waveform Bufferbloat Test. One grade for download, one for upload. The one to hand a customer.

Run a test wired, then over Wi-Fi from the same spot, and compare.

When a customer tells you the internet is fine because the speed test says so, what do you show them?

By Keith Parsons, CWNE #3, Wireless LAN Professionals. Free to read and share. Facts