AQM Characterization Guidelines Update

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AQM Characterization Guidelines IETF-92 Update (Summary)

- Feedback at IETF-91's AQM WG session
- Full review of -00 from *Alfred C Morton*
- Some comments on -01 from *Wolfram Lautenschlaeger*
- Submitted -02 on 9th March
- Two revisions submitted (-01 and -02) based on above feedback
  - Editorial work, minor fixes, etc.
  - More Clarity in all definitions as well as reporting of data related to end-to-end evaluation metrics
  - More flexibility in end-to-end measurement techniques/methods while providing recommendations
  - More precise classification of congestion levels
  - Encourages using queue-level metrics in collecting data when possible/relevant (only in addition to end-to-end metrics)
  - Encourages AQM tests on real system with detailed testbed setup info.
    (no more simulation-oriented mindset)

AQM Characterization Guidelines Update (metrics and their related data measurements)

- **What end-to-end metrics to report on?** SHOULD report on maximum number of metrics that are *relevant* to the context of scenario although not necessarily all.
  - Evaluations MUST rely on data gathered based on end-to-end metrics, although gathering data related to queue-level metrics is an extra advantage whenever supported by hardware/software and with negligible impact on AQM itself.

- **How to measure packet loss in real systems?** Use **RFC2680** (receive packet within a delay bound) method or Section 10 of **RFC2544** (count all packets send, count all non-dup packets received)

- **Elaborated on terminologies:**
  - Goodput from **RFC2647**
  - OWD from **RFC2679**
  - Jitter as PDV from **RFC5481**

- **RECOMMENDATIONS on measurement time-intervals (wherever relevant):**
  - Goodput samples (over time): every multiple RTTs, suggests minimum every 10 RTT or higher
  - Delay samples: per-packet (pair) whenever possible or minimum 10 samples per RTT
  - MUST be disclosed and SHOULD use exactly same intervals in all comparisons

AQM Characterization Guidelines Update (Test Scenarios)

- **Network scenarios:**
  - SHOULD investigate both symmetric and asymmetric link scenarios
  - SHOULD investigate bi-directional traffic in asymmetric link scenarios
    - With AQM in one direction only
    - MAY investigate with AQM in both directions
    - SHOULD investigate the impact of TCP ACK drops
  - SHOULD use same maximum buffer size across all tests

- **Traffic Mix:** is now a RECOMMENDATION instead of a MUST giving the tester some leverage
  - Defines a minimal set of RECOMMENDED setting(s) but allow the tester to develop their own

- **Different congestion levels:** uses Eq. 3 of R. Morris, "Scalable TCP congestion control", INFOCOM , 2000 to map loss ratios to number of flows
  - N = (C.RTT+b) * sqrt(loss_ratio/0.76)
  - loss_ratio for different congestion levels:
    - mild (1%), medium (5%) and heavy (10%) (version -01) (too high chosen loss rates in -01!)
    - mild (0.1%), medium (0.5%) and heavy (1%) (fixed in version -02)

AQM Characterization Guidelines Update (Required Discussion by the Tester)

- An AQM scheme SHOULD support ECN and the testers MUST discuss and describe the support of ECN