Proposed New DSCP: Non Queue Building (NQB)
draft-white-tsvwg-nqb-01

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TSVWG @ IETF104
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• Goal
  • Low latency and low loss for “sparse” traffic flows
  • Code point describes a verifiable behavior, not a value judgement
  • No incentive to mismark packets

• Use Cases
  • Dual-queue L4S link:
    • Identify non-congestion controlled flows that can coexist with L4S traffic in the LL-queue
  • LTE/5G link (?)
    • See draft-fossati-tsvwg-lola
  • fq_codel link
    • Identify non-congestion controlled flows that (in extreme situations) would prefer (?) tail drop rather than CoDel drops
L4S Use Case in DOCSIS 3.1

- Classify to Low Latency Queue based on
  - DSCP == NQB, or
  - ECN == ECT(1), or
  - ECN == CE

- Queue Protection (QP): continually verify that each flow is non-queue-building (NQB)

- If a flow causes queue build up, newly arriving packets are redirected to Classic queue

- No benefit for a QB flow to be marked as NQB

- Protects situations where QB flow is mismarked as NQB or ECT(1) (intentionally or not)

See [draft-white-tsvwg-lld](https://example.com) for details

Queue Protection algo defined in Annex P of:

[CM-SP-MULPlv3.1-I17-190121](https://example.com)
Non-Queue-Building (NQB) flow definition

• Non-congestion-controlled

• Claims that it will not cause a queue, i.e.
  • Relatively low peak data rate – expects to remain below available capacity in path

• If it does cause queue build-up, will suffer some consequences
  • In L4S with Queue Protection, mismarked packets would get reclassified to Classic Queue
    • May see higher latency, may arrive out of order
  • In LTE/5G, may see higher loss (?)
  • In fq_codel, will suffer from its own queue delay
NQB PHB definition

• Not a guaranteed service
• A node supporting the NQB PHB MUST queue non-queue-building traffic separate from queue-building traffic.
  
• This queue SHOULD disable AQM-induced packet drops for NQB marked packets.*
  
• This queue SHOULD support a latency-based queue protection mechanism that is able to identify QB behavior in flows that are classified into the NQB queue, and to redirect flows causing queue build-up to a QB queue.
  
  • e.g. as defined in Annex P of [DOCSIS-MULPlv3.1].
  
  • Not necessary (?) in fq_codel nodes.

*not yet in the draft
Proposal: NQB = 0x2A (42, 101010b)

• A currently unassigned codepoint in DSCP Pool 1 (standards action)

• Some implementations may wish to utilize a single queue for NQB and EF traffic
  • NQB = 0x2A = 101010b
  • EF = 0x2E = 101110b
  • single classifier (101*10b) would match both

• WiFi APs commonly default to mapping DSCP = 10****b to the Video Access Category (AC_VI)

<table>
<thead>
<tr>
<th>DSCP</th>
<th>WiFi Access Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>000***</td>
<td>Background (AC_BK)</td>
</tr>
<tr>
<td>001***</td>
<td>Best Effort (AC_BE)</td>
</tr>
<tr>
<td>10***</td>
<td>Video (AC_VI)</td>
</tr>
<tr>
<td>11***</td>
<td>Voice (AC_VO)</td>
</tr>
</tbody>
</table>

Common Defaults in WMM
Updates (draft 00 -> draft 01)

- Intended Status: Standards Track (was Informational)
- Added requirement statements
- Proposes definition of a new standardized DSCP (NQB = 0x2A)
- Updates in "Comparison to Existing Approaches"
  - updated the discussion of fq_codel
  - added discussion of "Heavy-Hitter-Filter" & Cisco's "Dynamic Packet Prioritization"
- Added IANA Considerations
- Added Security Considerations
Seeking WG adoption