Proposed New DSCP: Non Queue Building (NQB)
draft-white-tsvwg-nqb-02

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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

• Applicability
  • Dual-queue L4S link:
    • Identify non-congestion controlled flows that can coexist with L4S traffic in the LL-queue
    • Links with QoS classes that have optimizations for sparse traffic

• Use Cases
  • Cable Broadband (DOCSIS) link
  • LTE/5G link
  • WiFi link
Updates draft-01 -> draft-02

• Main changes
  • Merges “LoLa” (developed for LTE) into “NQB”
  • Explicit use cases section discussing DOCSIS, Mobile (LTE), WiFi

• Other changes
  • In “Comparison to Existing Approaches” section, reference “RD” mechanism, and previous “LoLa” approach.
  • Discusses implications on RFC8325 (“Mapping Diffserv to IEEE 802.11”)
Queue Protection Mechanism

• Draft recommends that the PHB include a QP mechanism
  • i.e. monitor queue depth and identify flows that are causing queue growth. Redirect such flows.
• Not needed in nodes that provide per-flow isolation (e.g. fq)
• Example algorithm provided in:
  • draft-briscoe-docsis-q-protection-00
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.

• Networks that support the NQB PHB SHOULD preserve the NQB DSCP when forwarding via an interconnect.

• Specific requirements for DOCSIS, LTE/5G, 802.11
Proposal: NQB = 0x2A (42, 0b101010)

• 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 = 0b101010
  • EF = 0x2E = 0b101110
  • single classifier (0b101*10) would match both

• WiFi APs commonly default to mapping DSCP = 0b10**** to the Video Access Category (AC_VI)
  • Draft recommends that RFC8325 devices implement mapping NQB to UP_6 (AC_VI) as well.

Common Defaults in WMM

<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>011***</td>
<td></td>
</tr>
<tr>
<td>001***</td>
<td>Best Effort (AC_BE)</td>
</tr>
<tr>
<td>010***</td>
<td></td>
</tr>
<tr>
<td>10****</td>
<td>Video (AC_VI)</td>
</tr>
<tr>
<td>11****</td>
<td>Voice (AC_VO)</td>
</tr>
</tbody>
</table>
Comments received (mailing list & offline)

• Add 5G nomenclature to Mobile section

• Mobile networks make use of highly variable channel capacity via deep buffering. Would be interesting to run lab tests to investigate the queue-depth & queue-protection implications.

• [offline] for LTE change:
  • “...MUST ... [use] ... low-latency ... bearer with QCI 7 ....”
  to:
  • “...MUST ... [use] ... low-latency ... bearer, e.g. with QCI 7 ....”.

• Several network operators (mobile & cable) and others expressing interest
Seeking WG adoption