

Non Queue Building (NQB) Per Hop Behavior

[draft-ietf-tsvwg-nqb-00](#)

Greg White, CableLabs

Thomas Fossati, ARM

TSVWG @ IETF106

Nov 18, 2019

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

Network use case examples

- Cable Broadband (DOCSIS) link
- LTE/5G link

Application use case examples

- Multiplayer online games (50 – 200 kbps)
- Cloud gaming uplink (50 – 100 kbps)
- VoIP (~100 kbps)

Status

- Draft adopted by TSVWG after discussion in IETF105
- D.Black requested edits be made prior to uploading as WG draft
 1. Indicate that proposed DSCP 0x2A is subject to change
 2. Mention that Traffic Protection (aka Queue Protection) related discussion needs more work (is it a requirement? What are the functional/behavioral requirements?)
 3. More discussion about Interoperability with WiFi is needed
 4. Fold in changes to 5G text as agreed at IETF 105
- continued...

Status, continued

- Mailing List comments
 - Draft does not read like a PHB definition.
 - Comparison to other approaches not needed
 - DSCP 0x2A will likely get bleached at ISP ingress, 0b000xx1 might survive
 - Concern about interoperability with WiFi (enterprise & residential)
- WG draft 00 uploaded Nov 4.
 - Includes D.Black items
 - Restructured to be more in-line with PHB specs (per RFC2474 / RFC2475)
 - Deleted comparison to other approaches

NQB PHB Definition

- Not a guaranteed service
- An NQB PHB node MUST queue NQB traffic separate from QB traffic.
- NQB traffic SHOULD NOT be rate limited or rate policed separately from QB traffic of equivalent importance.
- The NQB queue SHOULD be given equal priority compared to QB traffic of equivalent importance.
- The node SHOULD provide a scheduler that allows QB and NQB traffic of equivalent importance to share the link in a fair manner, e.g. a deficit round-robin scheduler with equal weights.
- An NQB PHB node SHOULD treat traffic marked as Default (DSCP=0x00) as QB traffic having equivalent importance to the NQB marked traffic.
- The NQB queue SHOULD have a buffer size that is significantly smaller than the buffer provided for QB traffic.
- An NQB PHB node SHOULD support a “traffic protection” function that can identify QB flows that are mismarked as NQB, and reclassify those flows/packets to the QB queue.
 - Traffic protection SHOULD be objective & verifiable, based on flow behavior not application-layer constructs

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 (?)

WiFi & NQB

- WiFi links can be a bottleneck. Support for NQB is highly desirable
- Future WiFi equipment could support the NQB PHB requirements
- Current WiFi equipment/networks do not. Can we interoperate?
 - WiFi equipment supports (essentially) 4 queues (BK, BE, VI, VO)
 - In residential WiFi networks, majority of traffic is BE, others are nearly unused
 - So, support for the “MUST queue separately” is sort of possible
 - But by default they are statistically prioritized
 - So, the “SHOULD give equal priority” is harder.
 - Some options:
 - Use VI, VO or BK, and configure the EDCA params to match BE (eliminate prioritization)
 - Use VI, but ensure that traffic remains sparse
 - ...and don't expect Traffic Protection
 - So, caution is needed. What can the draft say to ensure caution is used?
 - RFC8325 discusses this, is it sufficient?

BK=background
BE=best effort
VI=video
VO=voice

DSCP Recommendation

- Residential WiFi is an important factor
 - By default, APs/STAs use IP Precedence bits →
 - QOS_MAP can change the mapping (is it supported?)
 - ISP could re-mark downlink traffic if needed
 - Which DSCP would uplink applications be likely to adopt?
- Current draft recommends 0x2A
 - Unassigned “pool 1” code point
 - Maps to VI on existing residential WiFi
- Alternative proposals from mailing list
 - 0x06 & 0x2E (Sebastian Moeller) ← 0x2E already assigned to EF
 - 0x07 (Ruediger Geib) ← Pool 2 – local use
 - 0x1E (Jerome Henry) ← Already assigned to AF33

Default Mapping in WMM

| DSCP | WiFi Access Category |
|------------------|----------------------|
| 001*** 010*** | Background (AC_BK) |
| 000*** 011*** | Best Effort (AC_BE) |
| 10**** | Video (AC_VI) |
| 11**** | Voice (AC_VO) |

Open Items

- Traffic Protection
 - SHOULD or MUST?
 - what are the detailed requirements?
- Recommended DSCP value
- Are there hidden requirements in section 9 of the individual draft?
- Is more discussion needed around applicability in order to give guidance to application devs?