

# Requirements for Host-to-Network Collaboration Signaling

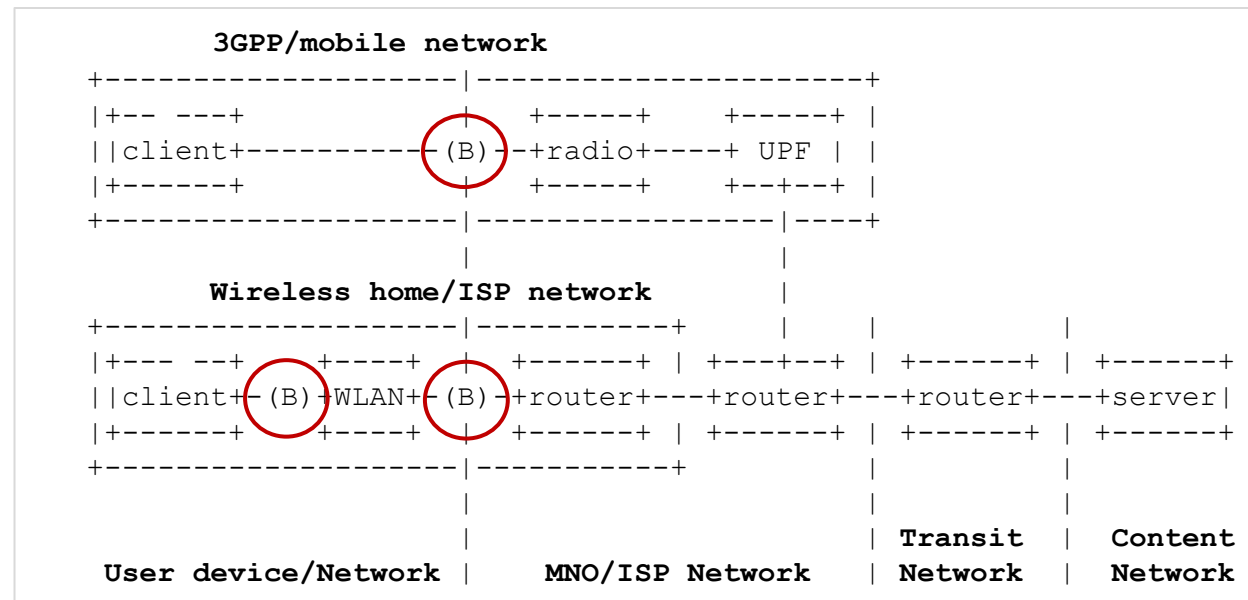
draft-kwbdgrr-tsvwg-net-collab-rqmts-04

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# Why Per-packet Metadata?

- *Complimentary to L4S* and congestion control algorithms
- Per-packet differentiation can improve QoE
  - Network hiccups occur *faster than sender can respond*



# Who Benefits from Per-packet Metadata?

Unreliable transports (unreliable QUIC, RTP)

- Application: Benefits *every sort of server*, e.g.,
  - CDN
  - Peer-to-peer (VoIP, interactive video, p2p gaming)
  - Small content providers (the next Venmo/Tiktok, SMB/Enterprise networks)
- Users: *Improve user experience during network hiccups*, e.g.,
  - Prioritize audio over video (e.g., Zoom conference)
  - Prioritize interactive activity over file copying
- Networks: *Enhances efficiency of network policies* and softens side effects of rate-limiting based on random packet discards.

# Tradeoffs

## Per-Session

- Signal at beginning/mid/end of session
- Signal frequency: low
- Policy for session applies to flows of a session (e.g., max bandwidth)

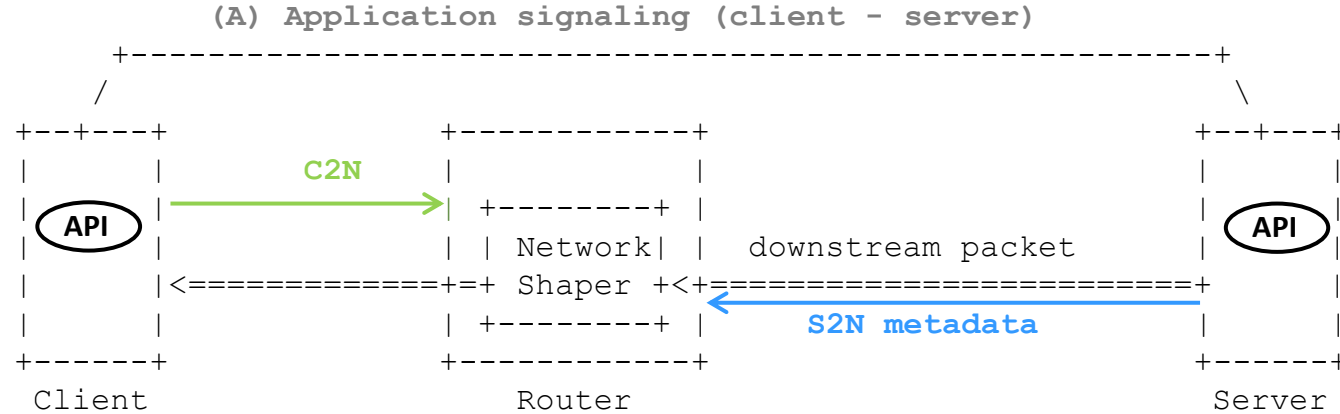
## Per-Flow

- Signals conveyed for flow (rate, DSCP, ECN)
- Signal freq: in receiver packets (ACK/RTCP)
- Sender reacts to changes in network (a few RTTs)

## Per-Packet

- Signal applies to a packet (priority, delay tolerance)
- Signal freq: every packet
- Network reacts to changes in network (sub-RTT)

# Requirements



## Client-to-Network

- **REQ-CLIENT-DECIDES:**  
honor application's metadata signaling
- **REQ-PAYLOAD-CLIENT-DECIDES:**  
Client decides relative priority of packet

## API, System

- **REQ-API-FRAMEWORK:**  
facilitate signaling for applications
- **REQ-PRIVACY-ADDITIONAL:** observer obtains no additional information
- **REQ-SIGNALING-AVOIDANCE:** avoid revealing application id/cause, server id, encrypted payload inspection

## Server-to-Network

- **REQ-PACKET-PRIORITY:**  
relative priority of packet
- **REQ-PACKET-DELAY:**  
tolerance to delay of packet

# Feedback Addressed in -04

- Shortened and Simplified the document
- QoE with higher sending rate with per-packet metadata (<https://dl.acm.org/doi/10.1145/3583740.3628438>) (Michael Welzl)
- Added tickets metadata obfuscation (Tom Herbert)
- Complements L4S/other reactive signals (Marcus Ihlar)
- IPFIX doesn't apply directly in this draft (Altanai Bisht)
- Added relationship to RFC 9419 (Tianji Jiang)
- Reference for comprehensive analysis on per-packet metadata: draft-Herbert-host2netsig (Zahed Sarker)

# Interest in Per-packet Metadata

- 26 participants interested at IETF119
- Still interest in per-packet metadata?
- Request adoption to consolidate a reference for requirements

end