

1-bit Content Classification

GSMA PACKET#97

7th Feb 2018

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Outline

- Where we come from
- Where are we now
- Where we want to go

Where we come from

Encrypted protocols

- Understand the impact of encrypted protocols on in-network functions (measurability, troubleshooting, optimisation) - in particular, at the intersection with the Mobile access
- Research - MAMI (H2020) project (Nokia, Telefonica, ETHZ, UoA, Simula, UoL, ZHAW)
- Standardisation (mainly IETF) => SPUD/PLUS, ACCORD & IAB MarNEW workshop, MAPRG

What can be done

- The wire image of an encrypted protocol is *opaque* by definition
- => Expose the smallest amount of information to the path that is strictly necessary to implement a given function (e.g., measuring RTT/loss/reordering, optimising for a prevalent use case)
- Examples, QUIC “spin-bit”, **LLT**, mobile throughput guidance, QUIC PN, UDP options, QUIC & DTLS CID...

Where are we now

(LLT-wise)

Experiment Overview

- Compare a baseline scenario where no traffic optimisation is used (control group) against two experimental groups
 - A. A LLT marking scheme is in use which has a bijective mapping to a set of "compatible" EPS bearers
 - B. AQM (PIE) is used before forwarding the traffic over the same (default) bearer

Experiment Overview (cont)

- The behaviour of each experimental group is assessed based on the measurable gain it produces over the baseline along two axes:
 1. Impact on the network (aggregate good-put)
 2. Impact on endpoints (QoE, energy savings)

Experiment Overview (cont)

- Two high-level questions that we want to answer:
 1. If an endpoint cooperates, does it get an advantage?
 2. If a (significant) proportion of the population cooperates, do we get a better utilisation of radio resources?

Gather Data!

- The experiments are described in a white paper produced by the Internet Group ("Content Classification" subgroup)
- Vendors and Operators to replicate in their labs
- **Understand whether intuition about cost/benefit trade-off is correct**

Activity plan

- The white paper is ready content-wise => Review
- Implement the white paper experiments in the 5TONIC lab (March-June)

5TONIC details

- Telefonica Lab in Madrid focused on 5G experimentation
- Booked from March to June 2018
- Two LLT experiments:
 - GSMA white paper
 - Connected car

Where we want to go

- Measure, analyse and disseminate results using relevant channels (measurement conferences, IRTF MAPRG, GSMA)
- If the results are positive, we need to come up with one or more LLT marking schemes (DSCP, QUIC LLT bit, a UDP option, ...) and discuss the alternatives for adopting the signal in the mobile network (multiple bearers - how many? -, LLT scheduler in SGi-LAN or as a MEC function?)
- Otherwise, we just say it's not worth the pain and we all go home

Backup

Experiment details

- Setup
 - Packet markings, EPS bearer mappings, AQM setup, UEs/eNB topology
- Boundary conditions
 - Traffic mix
- Reference flows
- Measures
 - QoE metrics to monitor

Experiment details (cont)

- For percent in range 75..95 step 5:
 - Inject traffic mix at \$percent capacity
 - Inject reference flows
 - Take the relevant QoE measures on each reference flow
 - Take the relevant energy consumption measure on the UEs
 - Compute cell aggregate good-put