Congestion-Control and Caching in CANES

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`http://www.cc.gatech.edu/projects/canes`

Sponsors: DARPA, NSF

Application: Congestion Control

Claims:

- There will always be applications that prefer to use best-effort service and dynamically adjust rate.
- Sender adaptation model has worked well in Internet.
- Sender adaptation has well known challenges.

Observation: Application knows *how* to adapt to congestion, while network knows *when* to adapt.

Application-specific Congestion Control

Operation:

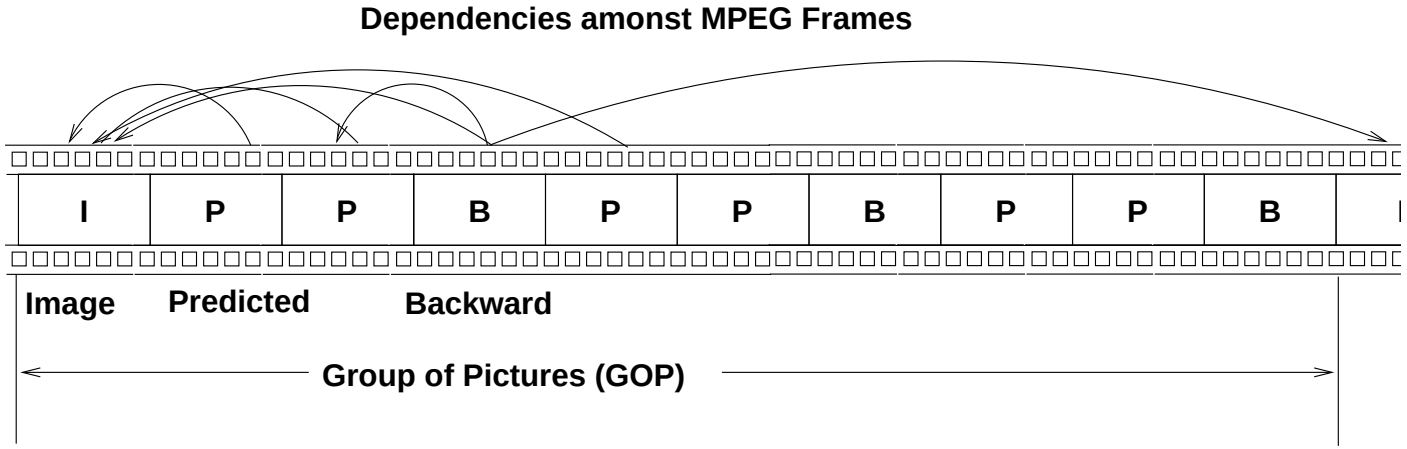
Based on triggers that indicate congestion control should take place, flow state is examined for advice about how to reduce quantity of data.

Ways to reduce quantity of data:

- Compress
- Transform
- Discard

An Example: MPEG

Structure of frame sequence:



Key features:

- Application-layer units, of several types
- Dependencies

Application-specific Policies for MPEG

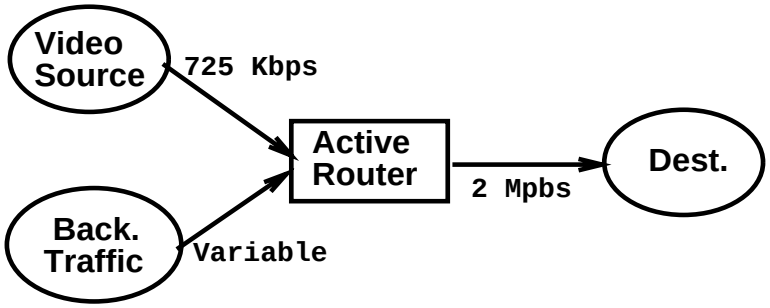
Trigger Policies:

- Invoke when arriving packet does not fit.

Discard Policies:

- Partial Packet Discard (PPD): Tail-drop IP packets.
- Static Priority: Impose static priority on *packets*.
  (priority I $>$ priority P $>$ priority B)
- GOP Discard: Discard entire Group of Pictures if I-frame cannot be accomodated.

Emulation Result



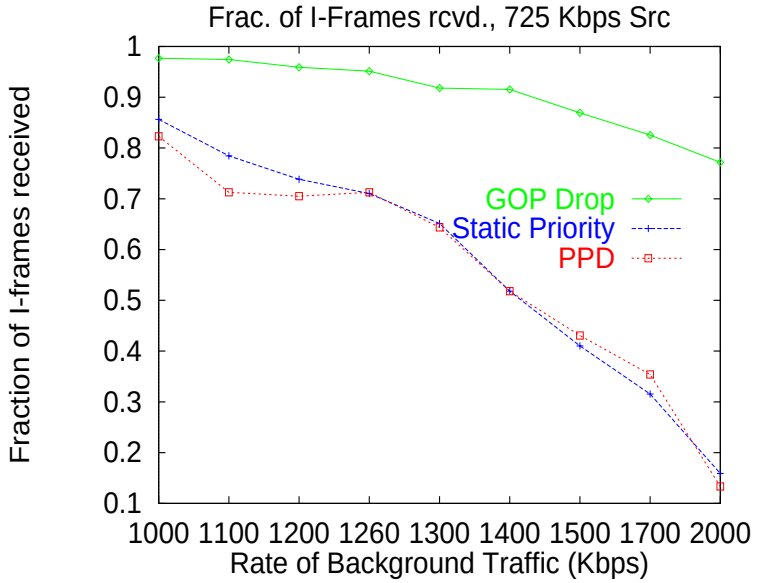


Figure 1: I-frames received

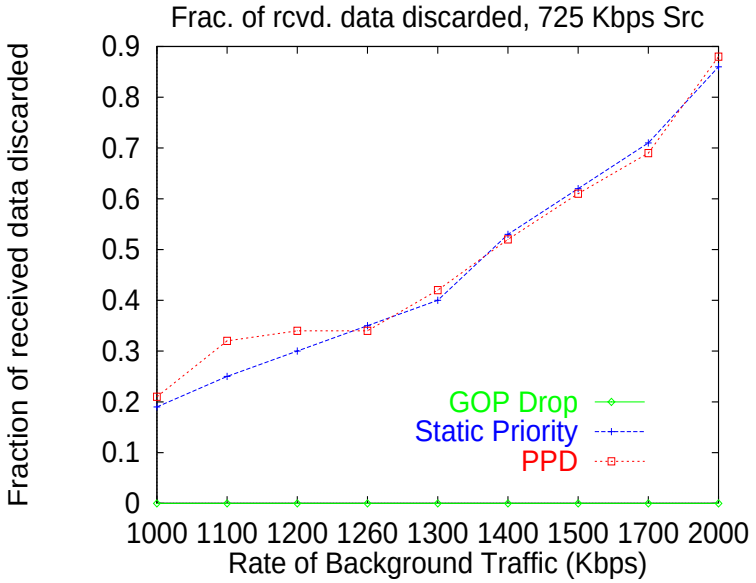


Figure 2: Wasted bytes at receiver