Evaluating Congestion Control for Interactive Real-time Media

draft-singh-rmcat-cc-eval-02

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Current Status

- 02 version makes some changes based on input from last IETF

- Open Issue: Metrics
  - Discard Rate
    - To measure trade-off of throughput and delay.
  - maximum end-to-end delay
    - Packets arriving later than this are DISCARDED

Metrics

- Bandwidth Utilization
  = RTP media rate/ bottleneck-link capacity
- Packet loss and discard rate
- Fair share with similar flows
  – Media rate of all flows should be equal?
- Fair share with TCP
  – Last IETF: Comments on removing it

Summary of Evaluation Guidelines

1. Avoiding Congestion Collapse
   - Does it require any changes to circuit breakers?
2. Stability
   - For stable link conditions does the sending rate oscillate, which may reduce the Quality of Experience
3. Media Traffic
   - Variable motion, series of variable talk spurts

4-6. Diverse Environments
   - Wired and wireless (802.11x, HSPA, GPRS)
   - Varying Path Characteristics
   - Reacting to Transient Events or Interruptions

7. Fairness With Similar Cross-Traffic
8. Impact on Cross-Traffic

Do we need a minimum set of guidelines?

Evaluation Scenarios: Parameters

- Video Start Rate: 128 kbps
- Maximum end-to-end delay: 300ms
  - 200ms, 400ms?
  - Different for audio and video?
- Video Frame rate: 15 FPS (30?)
- Audio packetization interval: 20ms
- MTU: 1450 bytes
- Router Queue length: ?

Media

- Use a packet generator

"varying amount of motion for video"

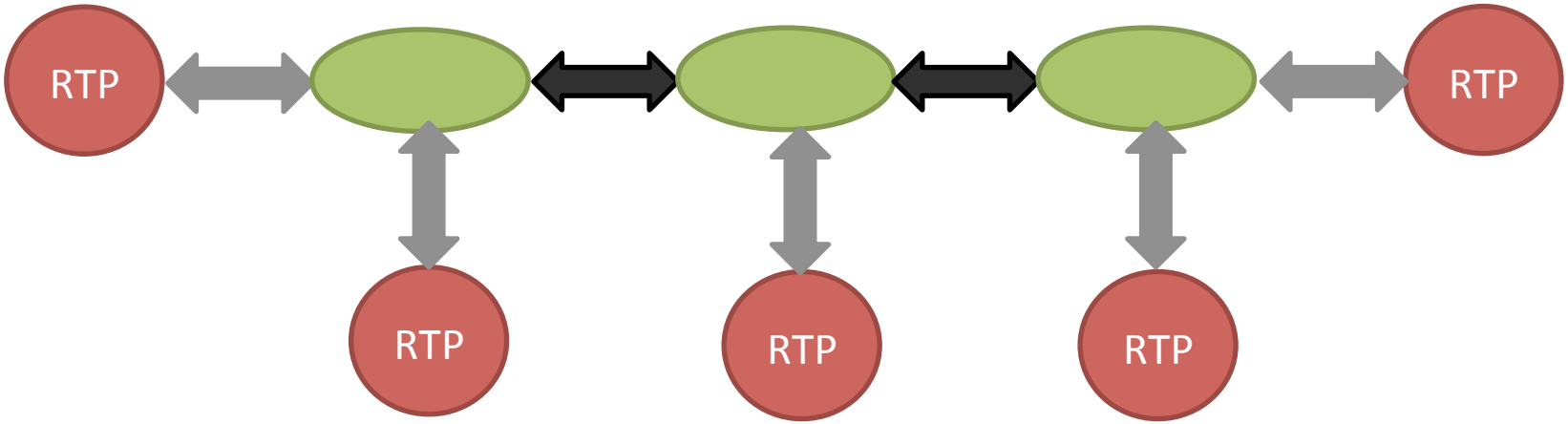
"variable frame size: I-frame, P-frame…"

- Use real video streams
  - Examples at: http://media.xiph.org/video/derf/

Topology

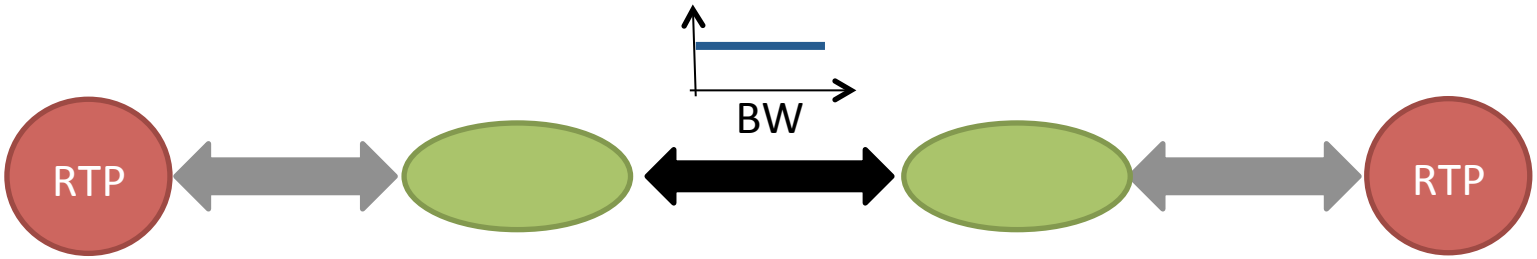
- Dumbbell (common bottleneck link)

- Parking lot (different bottleneck links)



Evaluation Scenarios (1/3)

- RTP on a fixed link



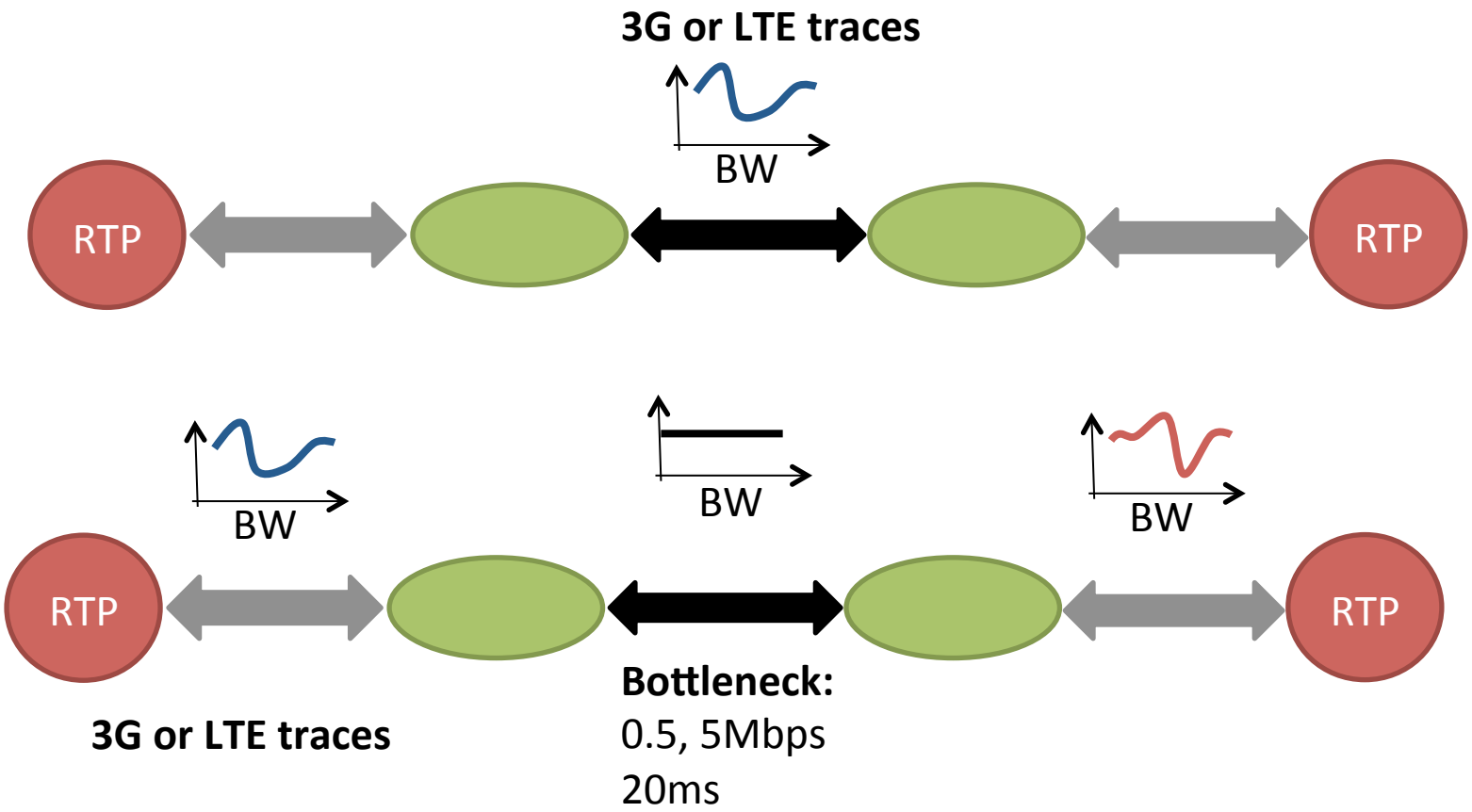
Access:
WLAN
ADSL

Bottleneck:
0.5, 1, 5 Mbps
10, 50, 120ms

For convenience we show only 3 hops and unidirectional flows

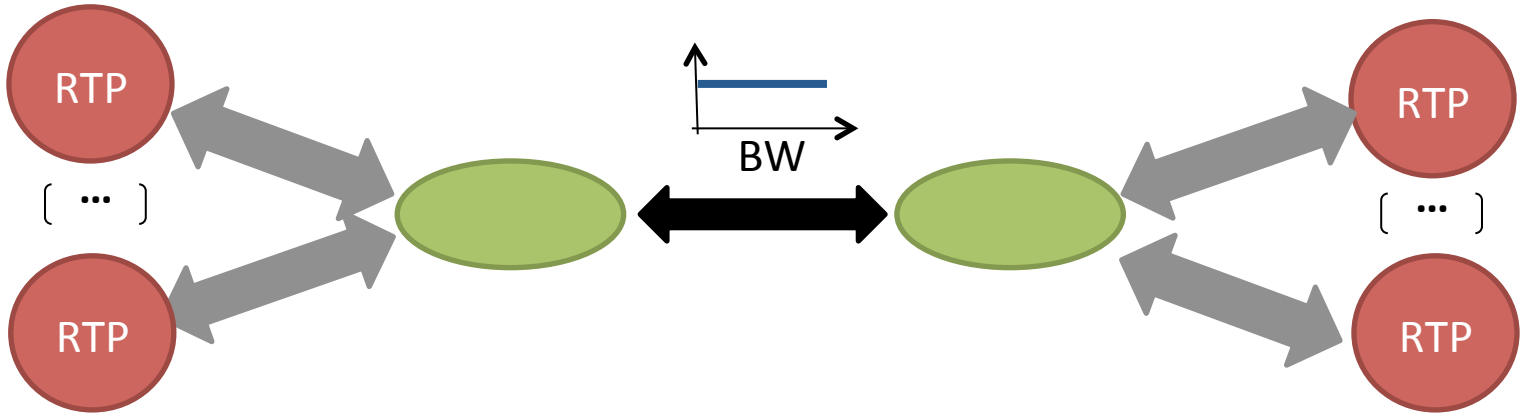
Evaluation Scenarios (2/3)

- RTP flow on a variable capacity link



Evaluation Scenarios (3/3)

- Self-fairness



These links can have same or different path properties

Scenarios:

1. All start at same time
2. Media flows are added at intervals

Open Issues

- Other metrics?
  - Trade-off between throughput, delay, loss
  - Quality metric