Modeling Video Traffic Source for RMCAT Evaluations

draft-ietf-rmcat-video-traffic-model

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Outline

- **What's new?**
- What's next?

WHAT'S NEW?

What's New (Outline)

- Updates on:
  - the draft
  - the video traces
  - the open source code (*syncodecs*)
- Plots

Updates on the Draft

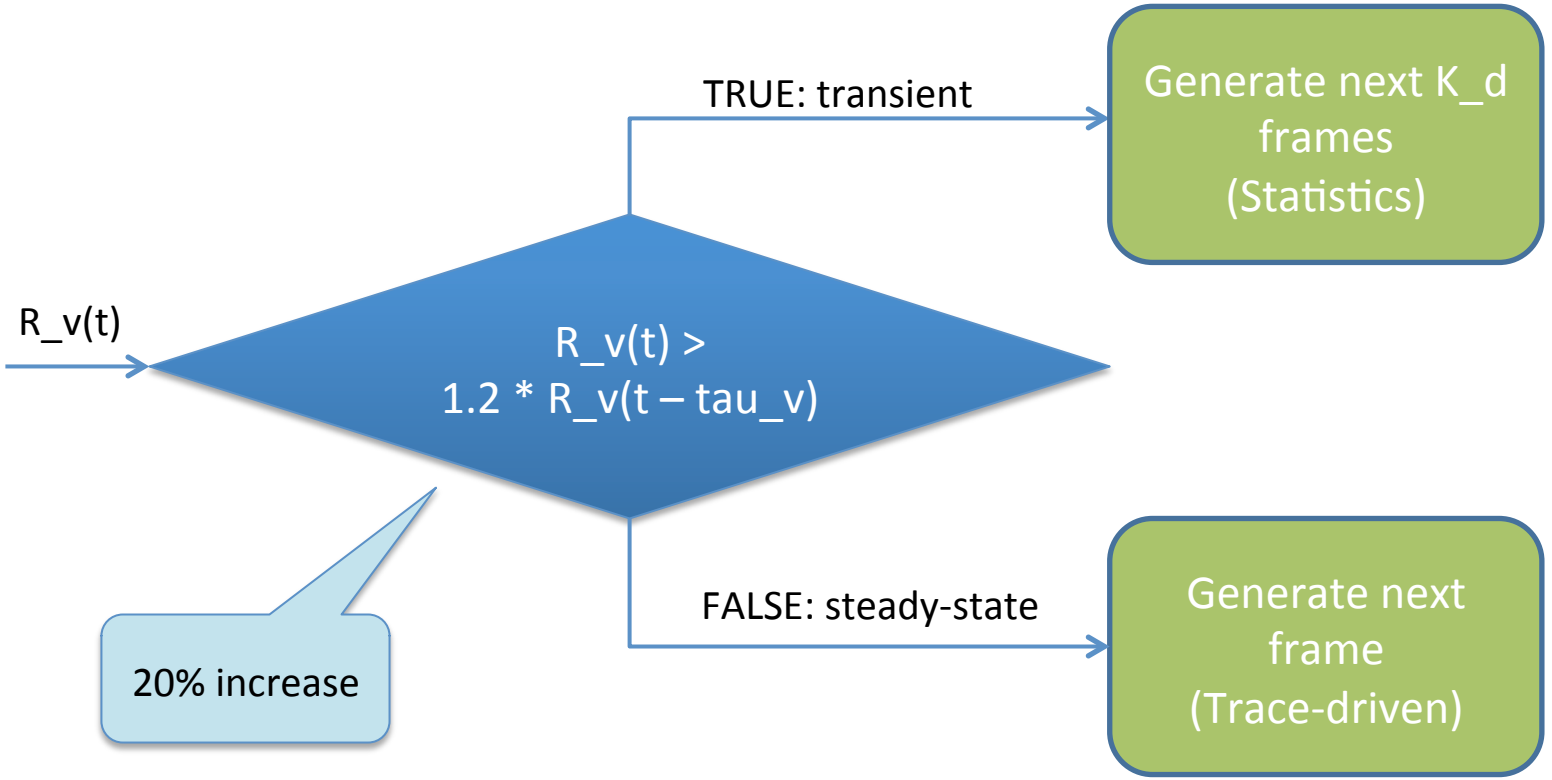
- Section 7
  - *Before* (draft-ietf-rmcat-video-traffic-model-00):
    - comparison of both models
  - *Now* (draft-ietf-rmcat-video-traffic-model-01):
    - guidelines on how to combine them
  - (see next slide)

- Other minor edits
  - (all over the document)

The Two Traffic Models

- Presented in previous meetings
  - http://www.ietf.org/proceedings/88/slides/slides-88-rmcat-9.pdf
  - http://www.ietf.org/proceedings/88/slides/slides-88-rmcat-2.pdf
  - http://www.ietf.org/proceedings/91/slides/slides-91-rmcat-0.pdf
  - http://www.ietf.org/proceedings/93/slides/slides-93-rmcat-4.pdf
  - http://www.ietf.org/proceedings/95/slides/slides-95-rmcat-3.pdf
- Statistical
  - Model of transient and steady state
  - Each state has different statistical distributions
- Trace-driven
  - Model of steady state with real codec traces
  - Scaling and interpolation of traces at different bitrates

Section 7: Combining the models



- "20% increase" based on observations in our experiments using x264 (see ietf-95 slides)
- Could be modified according to further experiments

Update on Video Traces

- The quest for video traces
  - Hard to find the right sequence
    - Length: minimum 1 minute (ideally 2 min)
    - Resolution: >= 1080p
    - Content: video conferencing ("talking head")
      - Very few (if any) scene cuts
  - Our sequences as of IETF-95:
    - Traces with right content, at 4K (*Foreman, News, Suzie)*
      - BUT, short! (10-12s)
    - Longer traces, at 1080p (*Elephant dream, Big buck bunny*)
      - BUT, animations (frequent scene cuts)
  - Still looking for the right traces
  - Interim solution: **stitching** short sequences together

Video Traces. Stitching (1)

- Source of video:

  `http://www.elementaltechnologies.com/resources/4k-test-sequences`

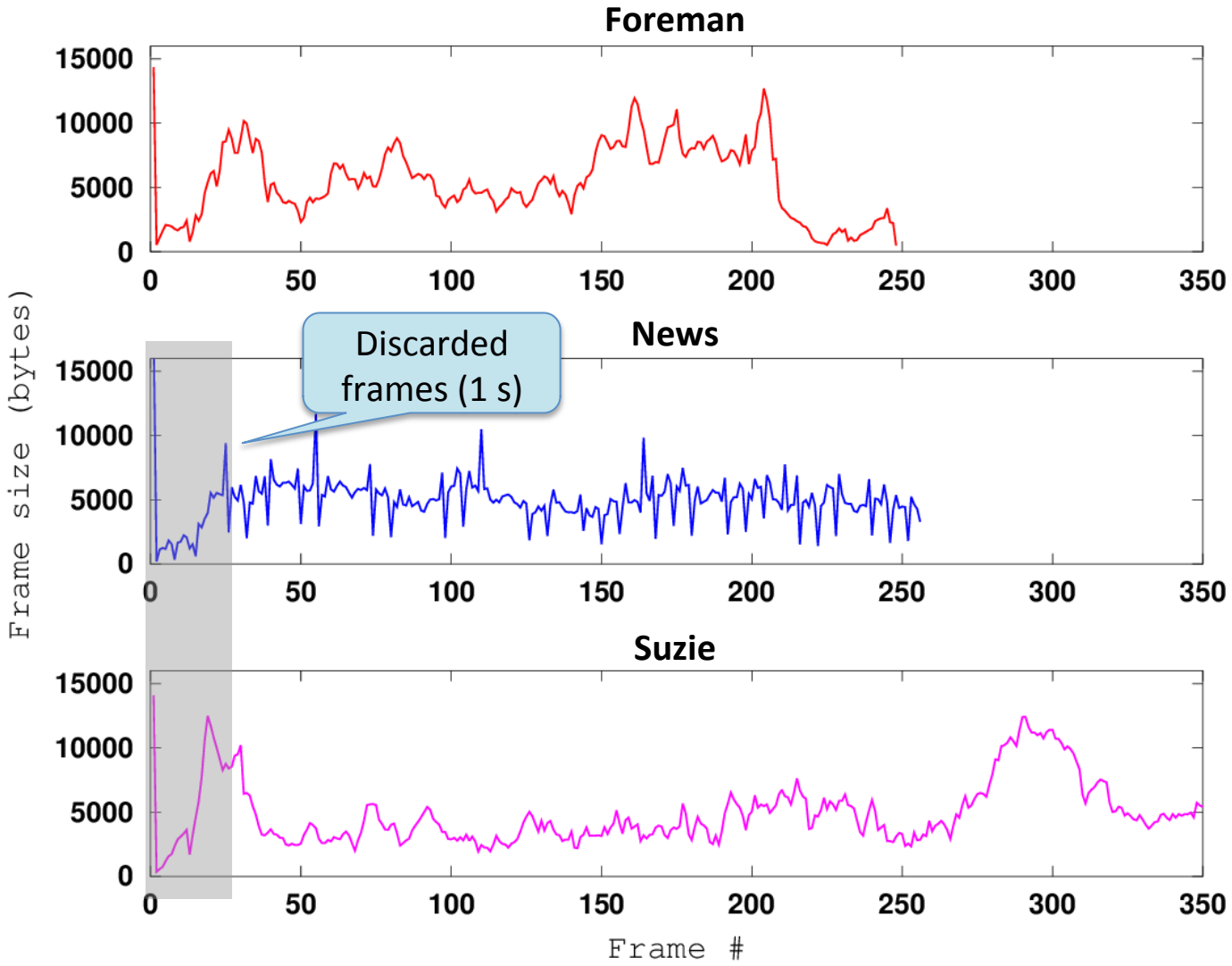
- Sequences: *Foreman, News, Suzie*
- Encoder: x264 (lookahead = 1 in rate control)
- Encoding parameters:
  - Resolutions: 1080p, 720p, 540p, 360p, 240p, 180p
  - Frame rate: 25 fps
  - Target rates: 100 ~ 1500 Kbps
  - Frame#1: Intra-coded (I), the rest: predictive (P)

`http://www.ietf.org/proceedings/93/slides/slides-93-rmcat-4.pdf`

Video Traces. Stitching (2)

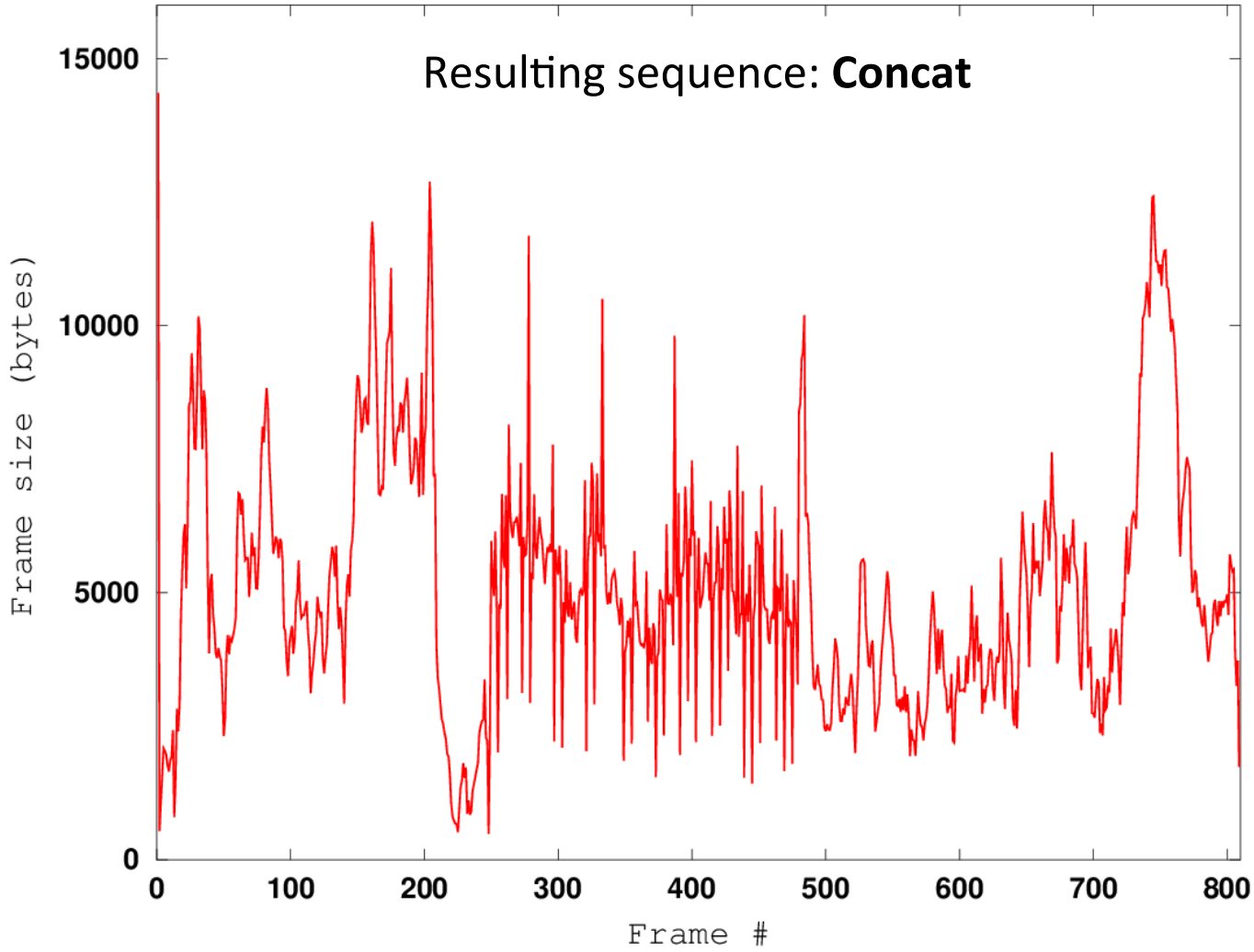
- Sequence order:
  - Foreman → News → Suzie
- For News & Suzie, remove first 25 frames (1 s)
  - I frame followed by smaller-than-normal P frames
- Gets us from 255 to 809 frames
  - (~10 s → 32 s)
- Added as a “new” sequence (*Concat*)

Example Traffic Trace: *Concat* (1)



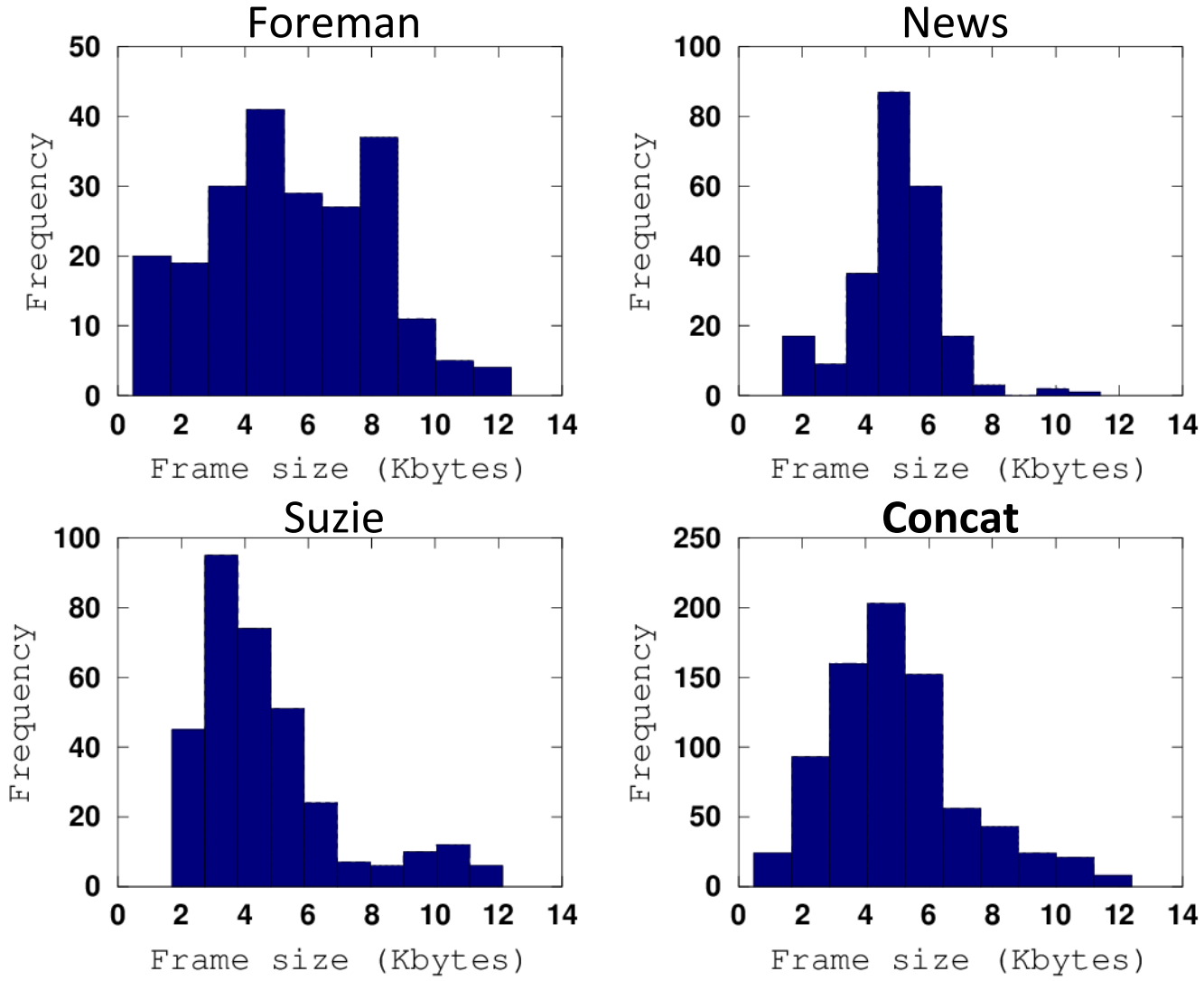
All three: resolution=540p, target rate=1000 Kbps

Example Traffic Trace: *Concat* (2)



resolution=540p, target rate=1000 Kbps

Distribution of Frame Size: *Concat*



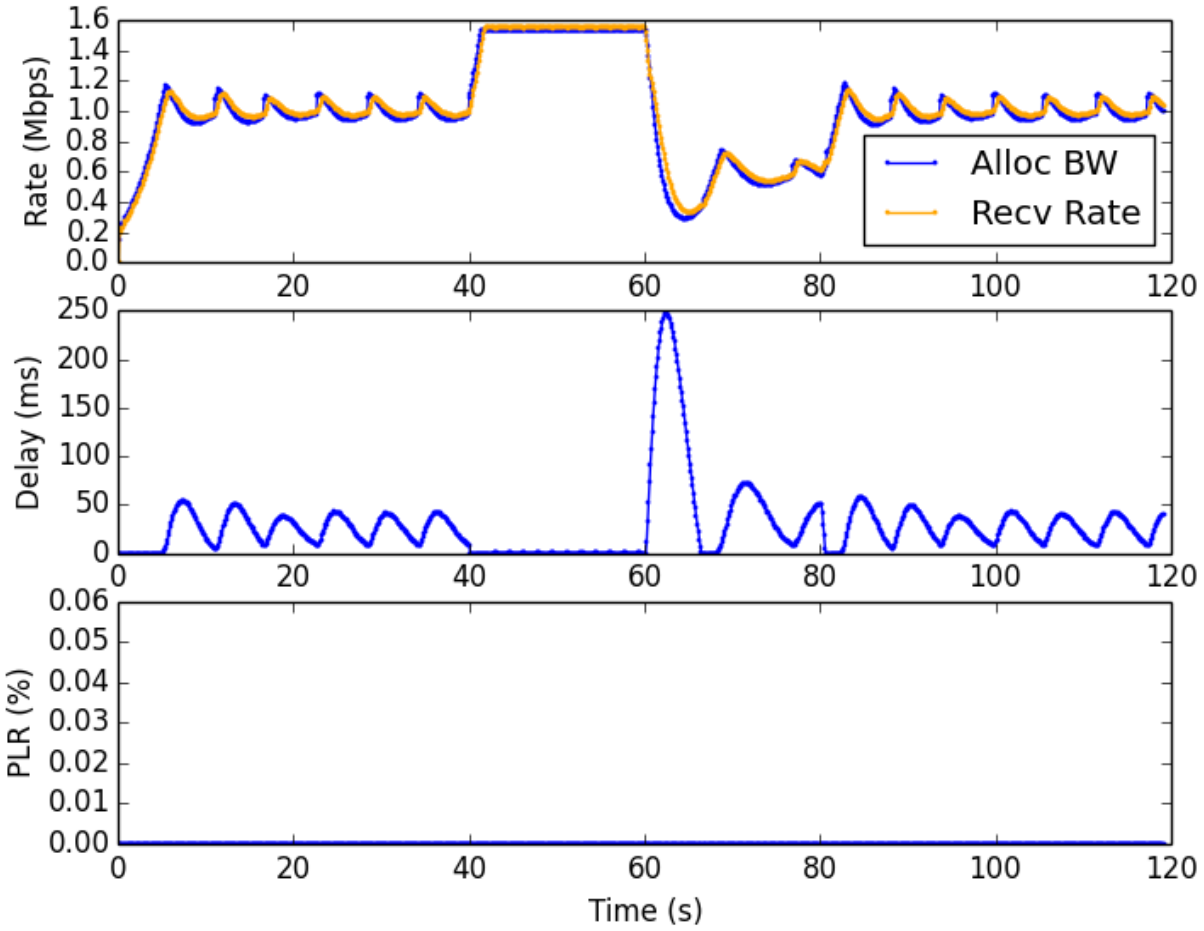
resolution=540p, target rate=1000 Kbps

Updates on *Syncodecs*

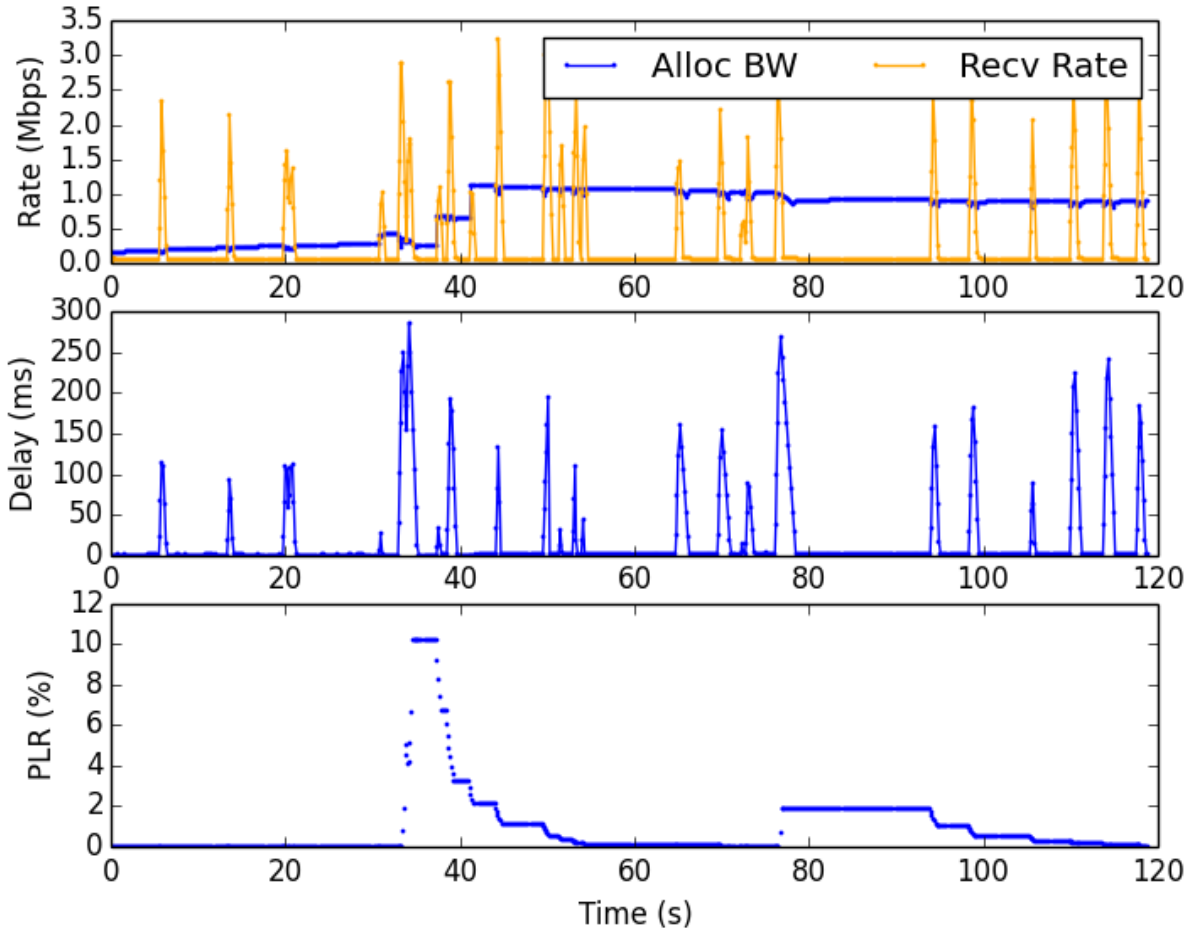
- Recap:
  - Codecs implemented as C++ iterators
  - Open source (`https://github.com/cisco/syncodecs`)
  - Standalone (ns2, ns3, real testbed, etc.)
- New codec added:
  - *Simple video content sharing*
  - Based on discussion in rmcat mailing list
  - *No-op* frames sent often (very low bitrate)
  - Transition frames:
    - 20x-200x the size of *no-op* frames
    - Sent with probability .05
  - (parameters configurable)

PLOTS

Perfect Codec. TC 5.1

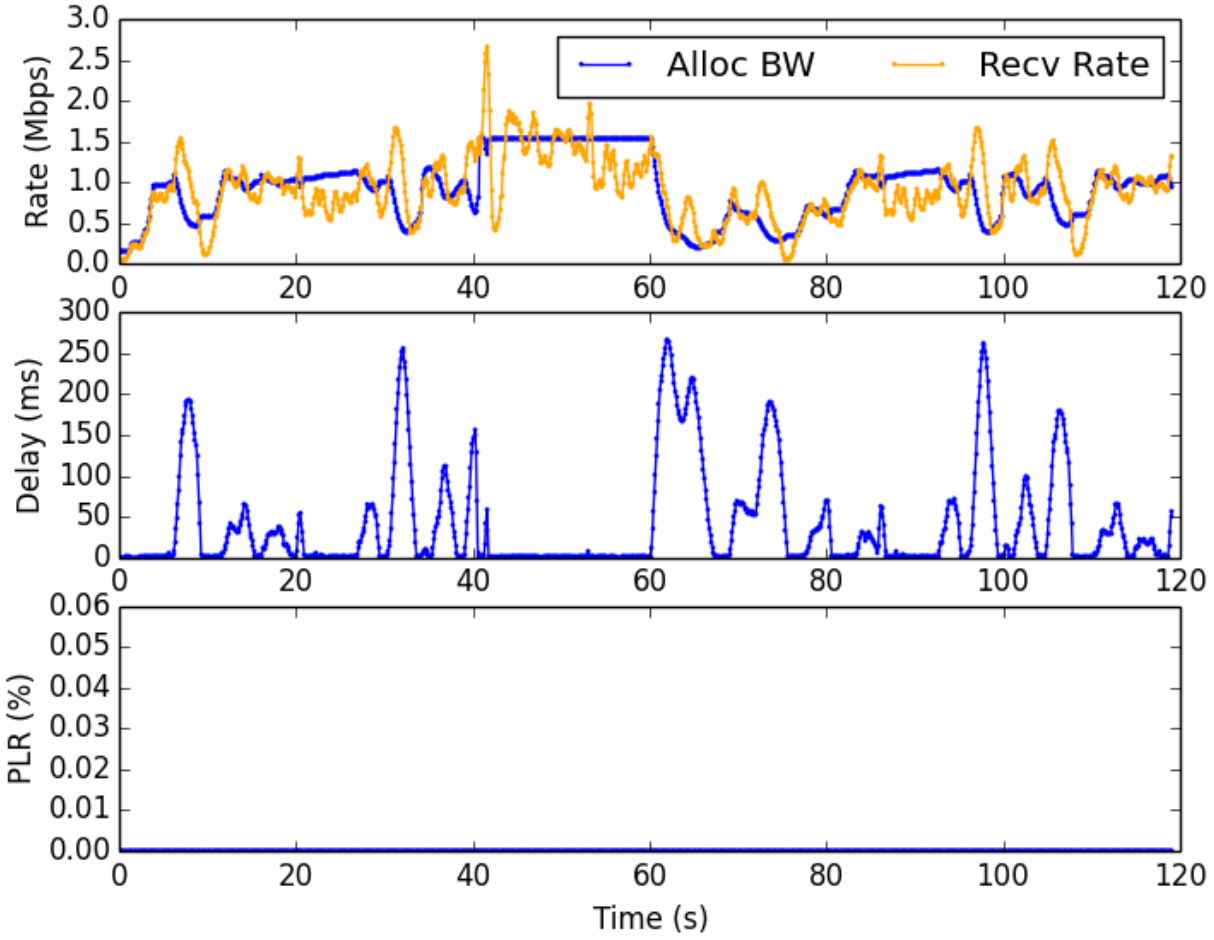


Simple Content Sharing Codec. TC 5.1



Trace-Driven Codec. TC 5.1

Concat sequence



WHAT'S NEXT?

Next Steps

- Implement hybrid model in *syncodecs*
- Find video sequences fulfilling our requirements
  - Long enough (1-2 min)
  - Contents: *talking head*
  - Resolution >= 1080p
  - Add trace files to *syncodecs*
- Further study transient behavior with codecs other than x264
- *Syncodecs*: feedback from users
  - Would be pleased hear/learn from your experience

Thank you

Questions?