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/91/slides/slides-91-rmcat-0.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

R_v(t) > 1.2 * R_v(t – tau_v)

TRUE: transient
Generate next K_d frames (Statistics)

FALSE: steady-state
Generate next frame (Trace-driven)

• “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:
  – Frame rate: 25 fps
  – Target rates: 100 ~ 1500 Kbps
  – Frame#1: Intra-coded (I), the rest: predictive (P)

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: \textit{Concat} (1)

All three: resolution=540p, target rate=1000 Kbps
Example Traffic Trace: *Concat* (2)

Resulting sequence: **Concat**

resolution=540p, target rate=1000 Kbps
Distribution of Frame Size: *Concat*

**Foreman**

- Resolution: 540p
- Target rate: 1000 Kbps

**News**

- Resolution: 540p
- Target rate: 1000 Kbps

**Suzie**

- Resolution: 540p
- Target rate: 1000 Kbps

**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?