NDN Real Time Conferencing Library

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Introduction

Design Goals

- Real-time audio/video/text chat library which allows many-to-many conferencing over the NDN network and requires no direct communication between peers
- Starting point for NDN traffic congestion control algorithm research
- Test NDN-CPP library and NFD
- Traffic generator for the testbed

Namespace Design

- Root: User prefix (username)
- Media streams
- Encoding threads: Individual encoding parameters
- Frame type: Key and Delta frames
- Packet: Individual media packets
- Data type: Data and Parity segments
- Segments: Actual NDN-data objects

Buffering

- Cache exhausting:
  - Latest data can’t arrive faster producing rate
  - Cached data arrives at the rate it was requested
- Chase mode:
  - Issue interest for the RIGHTMOST segment
  - Pipeline interests for first segments of the following frames with higher than producer rate
  - Monitor segments arrival interval
- Future improvement: use audio stream for chasing video

Frame fetching

- Generation delay $d^{gen}$ – time interval between receiving an interest and satisfying it with data (producer-side)
- Assembling time $d^{asm}$ – time needed to fetch all frame segments (consumer side)
- $RTT_n$ – round trip time for the interest (consumer side)

Start-up

- Consumer for 3 streams: NDNComm, REMAP and Demo-2
  - Producer: webcam producer (SD, 25fps, 500kbps)
    - connected to UA NFD (Ariona)
    - NDN-RTC prefix: /ndn/edu/arizona, NDN-RTC username: demo1
- Demo 1:
  - Consumer for 3 streams: NDNComm, REMAP and Demo-1
    - Producer: webcam producer (SD, 25fps, 500kbps)
      - connected to UA NFD (Ariona)
      - NDN-RTC prefix: /ndn/edu/arizona, NDN-RTC username: demo2
- Simulated link break b/w Arizona and CAIDA every minute

Future Work

- Real-time Adaptive Rate Control
  - In collaboration with Panasonic R&D department (Muramoto-san, Yoneda-san)
  - Keep low-latency transmission & best throughput
  - Maintain RTT fairness (self-fairness)
  - Consumer-driven
  - NW bandwidth estimation based on RTT and timeouts
  - Control interest rate according to bandwidth estimation
- Conference discovery
- Browser integration
  - NDN-RTC Firefox NPAPI plug-in
- Security:
  - Web of Trust model
  - Media encryption
- Desktop conferencing tool