GENERATING REPRESENTATIVE VIDEO
TELECONFERENCING TRAFFIC

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USC/ISI
CSET 2022
August 8, 2022
Contribution: VTC traffic generator for network experimentation

• Configurable, Reproducible, and Realistic traffic generation is critical for designing and building the latest networking technologies.
• Video Teleconference (VTC) is a large and growing fraction of all internet traffic.
• VTC is one of a suite of traffic generators we have created – including video streaming \(^1\) and cloud document editing.

\(^1\) Ardi et al. CSET ’21
VTC Topology (party > 2)

VTC Controller → VTC Clients (bots) → VTC Applications (Zoom, Microsoft Teams, Jitsi)

Media Library

Internet

On Testbed
VTC Clients

RPC server
• listens to commands from the controller and responds with status messages
• e.g. initialize devices, start playback, stop playback, media selection, status, etc.
8+ Bots on Lighthouse Testbed

Scalable to ~100, with 40 on video
Does Bot Traffic Look Like Human Traffic?

Network Traffic Comparison

<table>
<thead>
<tr>
<th>Clients</th>
<th>Source resolution</th>
<th>Duration (m:s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3x human</td>
<td>Varies</td>
<td>5:06</td>
</tr>
<tr>
<td>3x bot</td>
<td>270p</td>
<td>5:16</td>
</tr>
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<td>5:09</td>
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Bot Vs. human packet capture

 ✓ Capture size      171-479 MB depending on camera resolution
 ✓ Protocol distribution 99+% UDP
 ✓ Aggregate flow size H→C, 15-20MB each, C→H, 37-135 MB each

Flow temporal analysis TBD

Captured from videobridge server
Measuring VTC Quality for Experimentation

Quality of Service:
- *What is the network doing?*
- Bitrate, latency, packet loss, observable network characteristics

Quality of Experience:
- *How happy is the end user?*
- **Gold standard**: Mean Opinion Score (MOS)
  - 1-5 subjective human rating

Approximating QoE:
- Platform Dependent
- Jitter and Latency

![Graph showing Aggregate RTT (Jitsi Video Bridge) over time](image)
Coming Soon

• Conversation dynamics grounded in **empirical evidence**
• Automatically generated video of bot faces
  • No more finding free-use videos and looping them!
  e.g. [https://this-person-does-not-exist.com/](https://this-person-does-not-exist.com/)

Image credit: Pankaj Kishore, Towards Data Science
Thank you

Source code coming soon: https://mergetb.org/projects/searchlight/
Questions: deangeli@isi.edu
Backup Slides
VTC Controller

• Orchestrates the conversation by driving the VTC clients simultaneously.

• Contains logic to approximate human conversation patterns.

• Provides basic operator UI.

• JSON configuration file.
# Does Bot Traffic Look Like Human Traffic?

## Network Traffic Comparison

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<td>UDP</td>
<td>A→H: 135, B→H: 133, C→H: 133, H→A: 19, H→B: 19, H→C: 17</td>
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<tr>
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<td>270p</td>
<td>171</td>
<td>5:16</td>
<td>UDP</td>
<td>A→H: 38, B→H: 37, C→H: 37, H→A: 15, H→B: 16, H→C: 16</td>
</tr>
<tr>
<td>3x bot</td>
<td>1080p</td>
<td>373</td>
<td>5:09</td>
<td>UDP</td>
<td>A→H: 51, B→H: 130, C→H: 126, H→A: 15, H→B: 16, H→C: 15</td>
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Captured from videobridge server
Managing Quality of Service (QoS) for distributed applications on the internet.

• Video Teleconference (VTC) is a large and growing fraction of all internet traffic.

**Contribution:** VTC traffic generator for network experimentation

• Realistic traffic generation is critical for designing and building the latest networking technologies.
  • VTC is one of a suite of traffic generators the Searchlight evaluation team has created – including video streaming [1] and cloud document editing.

[1] Ardi et al. CSET ‘21