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Perfecting Broadband

Video Streaming

Experience sharing from scale testing sessions

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Video Streaming - Perspective of End user

- Delays
- Buffering interruptions
- Freezes
- Distortions

- MOS Score
  - ITU Recommendation P.800.1
  - VQEG (Video Quality Experts Group) MOS models
- Perspective of the Device
  - Screen specs, HW specs, codec specs

Video Streaming - Perspective of Multimedia team

- Content
  - Slow movement - Eg: News reading, Animation
  - Medium movement - Eg: Movies
  - Fast movement - Eg: Sports
- Resolution
  - HD, 1080p (16:9-1900x1080), 1080i
- Frame rate
  - 16 fps, 24 fps, 30 fps
- Codec
  - H264
  - VBR/CBR, Rate Factor (RF)
- Container
  - MP4, Avi,
- Streaming Protocol
  - RTP, HTTP streaming, DASH

Video Streaming - Perspective of networking team

Question

What’s bitrate of a of a typical HD video stream (1080p, 24fps, H264 CBR)

A- 500 kbps

B- 2500 kbps

C- 4500 kbps or above

D- All the above

E- None of the above

Bit rate of a typical HD video stream

- Slow moving animation
  - 1000 -1500 kbps
- Medium movement action movie
  - 2500-3000 kbps
- Fast moving sport scene
  - 4500-5500 kbps

Bitrate estimation models

- Kush gauge (adobe)
  - bitrate in kbps = pixel count * motion factor * 0.07 ÷ 1000
  - Where pixel count = frame width x height and motion factor is 1, 2 or 4

Approach to test video streaming

- Videos of different content in different bitrates [video level 1-5]
- Select videos based on AP's capability
  - Throughput at different number of clients
  - Air time fairness

	40 Clients	70 Clients	100 Clients
Videos for the test	Video Level 3	Video Level 2	Video Level 1
	Video Level 4	Video Level 3	Video Level 2
	Video Level 5	Video Level 4	Video Level 3

Video streaming using 100 real clients

- 100 laptops (2x2): mix of 11AC and 11N
- For each AP under test
  - For number of clients [40,70,100]
    - Run Iperf3
      - Measure TCP DL TP
    - Stream videos using browser
      - Measure errors [manual]
        - Delay
        - Buffering Interruptions
        - Freezes
        - Distrontions
      - Based on errors give Pass/Fail
  - Based on Pass %
    - Give ratings [5-Excellent,1-Poor]

Video Link of older session with 50 clients:
https://goo.gl/3wgRFF

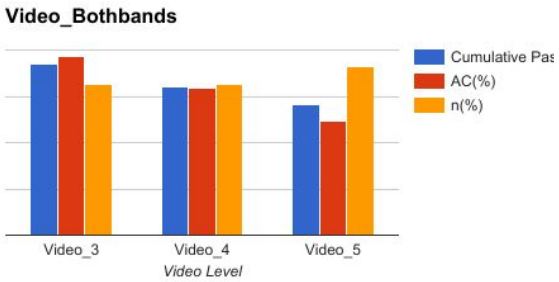
Video streaming using SWAT WiCheck

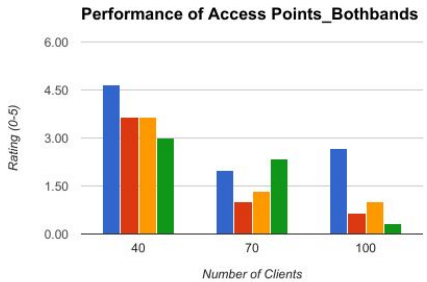
- Up to 256 stateful WiFi clients per box on a single channel
  - Each client can be set up independently
  - Multiple boxes can be linked together in a system
  - GUI and CLI versions, automated testing via ROBOT
- What can be controlled
  - Simulated traffic with different QoS levels (VO, VI, BE, BK)
  - Real application & data bound on each client
- What can be tested
  - Single or multiple APs
  - End to end infrastructure (APs, Controllers, Gateways, Servers)
  - Scalability, stability, load
- Testing Video streaming
  - ROBOT scripts to analyse video streams over http and make a report with kpis

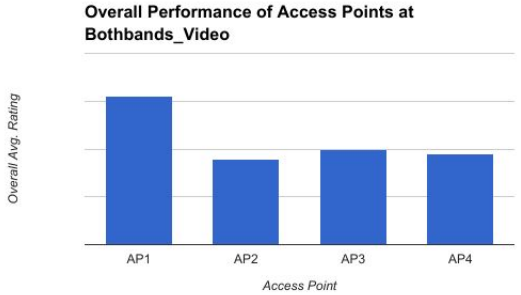
wicheck.alethea.in

Findings

- All APs are not made equal
- Total Throughput performance may not result in better video streaming
  - Better ATF => better video streaming at scale
  - Balancing clients between bands
- A win with certain number clients does not imply a win with higher number of clients







Thank you

- About Alethea
  - Founded in 2010
  - With a vision to perfect broadband communications technologies
  - Offices in Bangalore and San Diego
  - Offering Products and Services to help the ecosystem optimize new products & technologies
  - www.alethea.in

- Happy to get connected
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