



HD WiFi: A Data-driven Study

Alethea Communications Technologies
www.alethea.in
info@alethea.in

High Density Testing

If Uplink throughput with 5 Clients is 200 Mbps, how much will it be with 30 Clients?

If Downlink throughput with 30 Clients is 260 Mbps, how much will it be with 75 Clients?

If 2000 Kbps video for 75 Clients gets all passes, then how will 1500 Kbps video perform for 100?

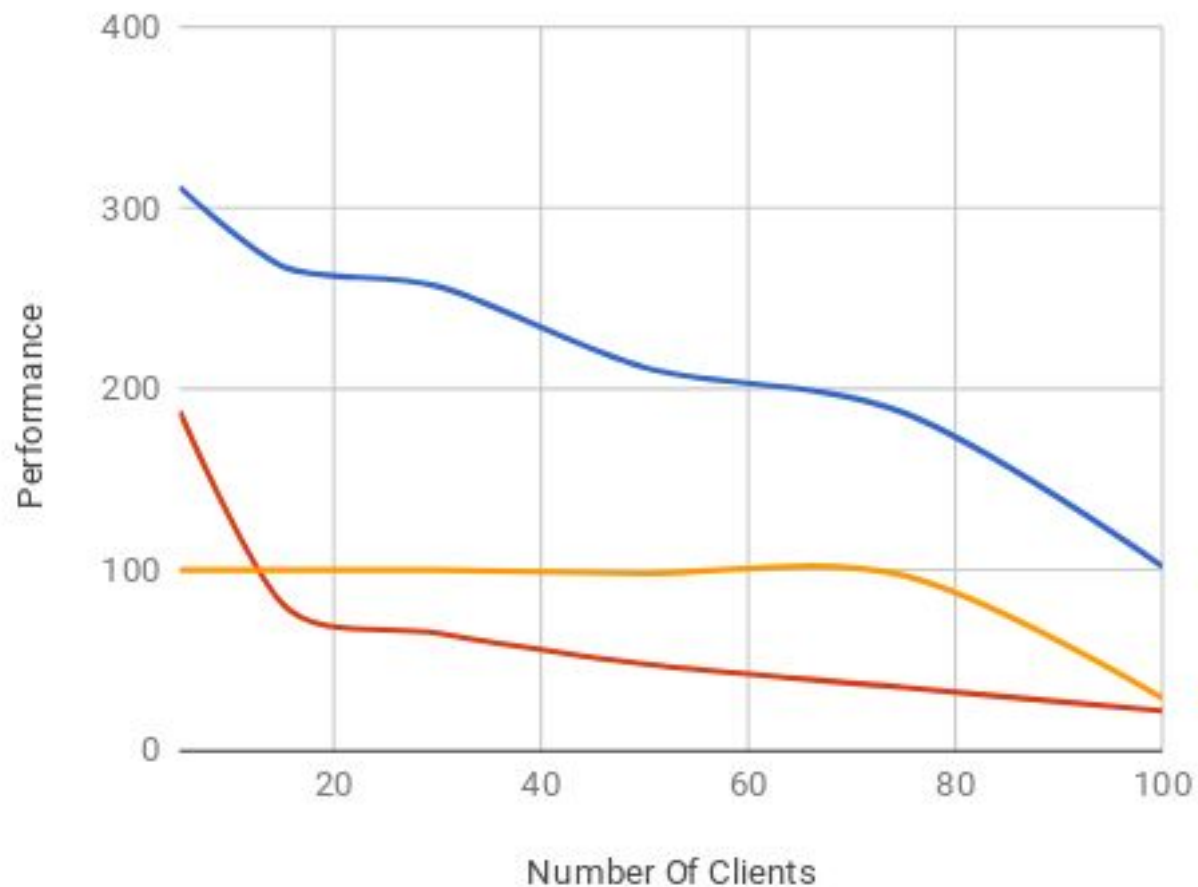




<https://www.instagram.com/p/W2BuMLQLRB/>



Performance while Scaling



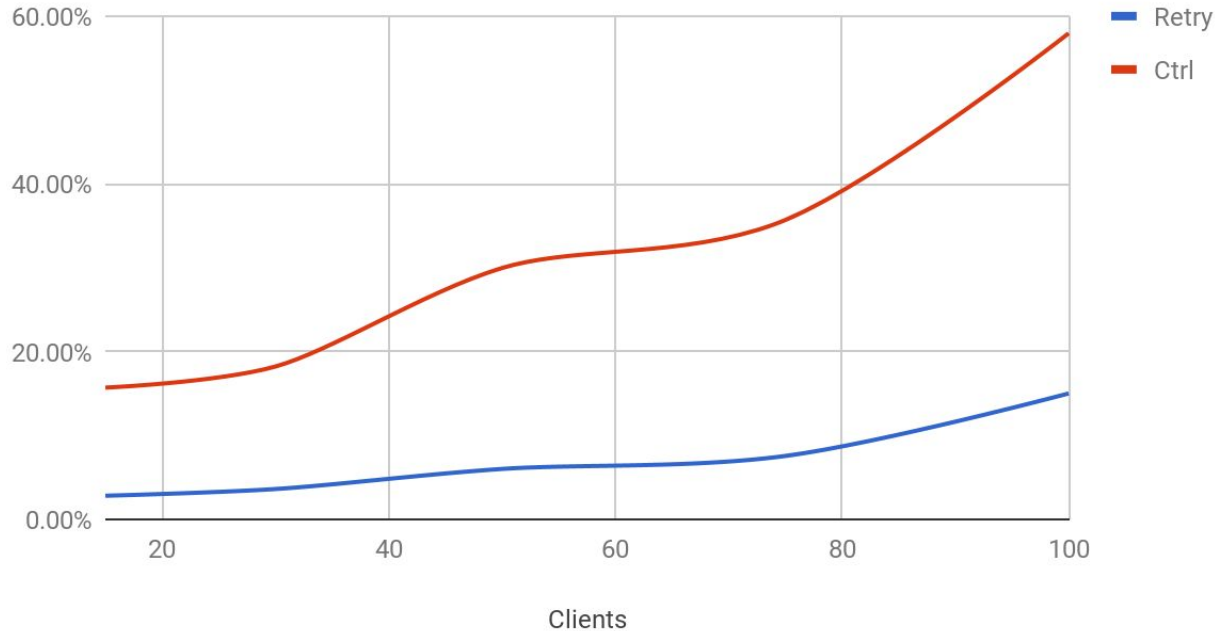
- TCP DL (Mbps)
- TCP UL (Mbps)
- Video (Pass Percentage)

| Clients | DL | UL | Video |
|---------|-----|-----|-------|
| 5 | 312 | 188 | 100 |
| 15 | 268 | 81 | 100 |
| 30 | 257 | 65 | 100 |
| 50 | 212 | 48 | 98 |
| 75 | 187 | 35 | 97 |
| 100 | 102 | 22 | 29 |



Uplink Throughput - Analytics

Retry and Ctrl

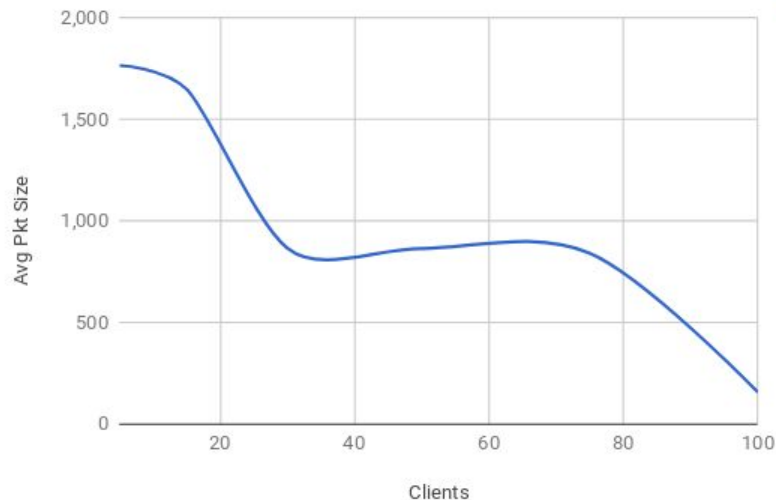


| Clients | Retry | Ctrl |
|---------|--------|--------|
| 15 | 2.82% | 15.71% |
| 30 | 3.62% | 18.22% |
| 50 | 6.01% | 29.97% |
| 75 | 7.56% | 35.70% |
| 100 | 15.01% | 57.96% |

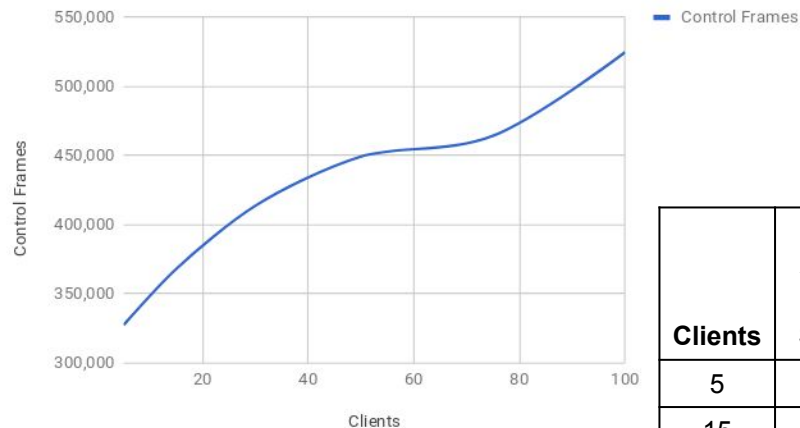


Downlink Throughput - Analytics

Avg Pkt Size vs. Clients



Control Frames vs. Clients

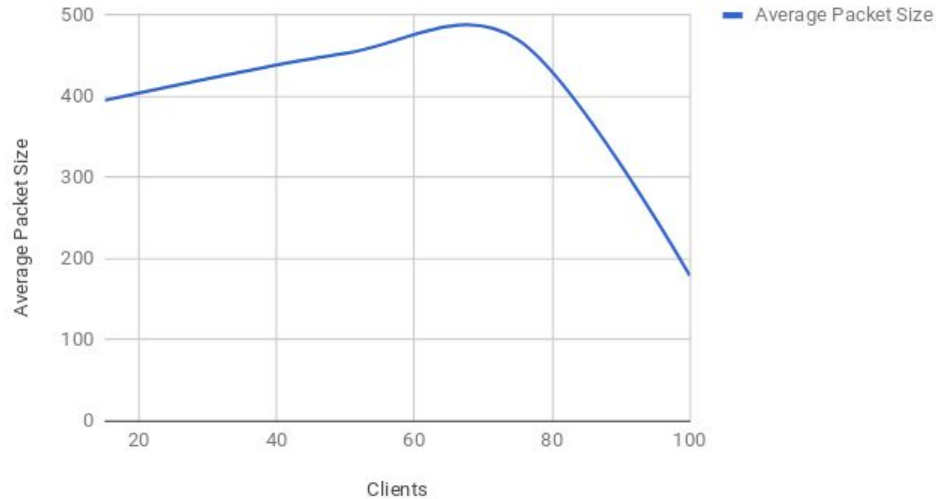


| Clients | Avg Pkt Size | Control Frames |
|---------|--------------|----------------|
| 5 | 1,767 | 327,492 |
| 15 | 1,651 | 368,230 |
| 30 | 867 | 413,867 |
| 50 | 865 | 449,429 |
| 75 | 842 | 464,413 |
| 100 | 156 | 524,861 |

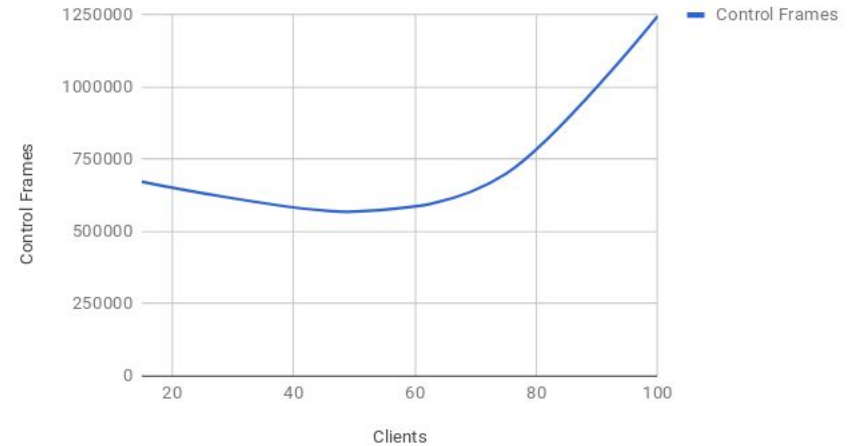


Video Performance - Analytics

Average Packet Size vs. Clients



Control Frames vs. Clients



| Clients | Avg Packet Size | Ctrl Frames |
|---------|-----------------|-------------|
| 15 | 395.11 | 672568 |
| 50 | 453.11 | 569107 |
| 75 | 491.80 | 699796 |
| 100 | 178.97 | 1246177 |



Major Degradation Factors & Root Cause

Control Frames in Uplink

- Lack of coordination
- Aggression
- Collisions

Packet Size in Downlink

- Fairness Attempt
- Latency



Higher Layer Solutions

Uplink Scheduler

- Device Aggregation Management

High Density Testing

- Real Clients
- Emulated Clients

Downlink Scheduler

- Separate Algorithm for each QoS
- Fairness within QoS, not across
- Learning from Past
- Application based optimization





Thanks!

Please visit our booth to discuss further /
get details of the analysis

