COMP445

LAB 2

Alawadi Mustafa (40217764)

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TASK 1

1. bbb_30fps_1024x576_2500k
2. bbb_30fps_1280x720_4000k
3. bbb_30fps_1920x1080_8000k
4. bbb_30fps_320x180_200k
5. bbb_30fps_320x180_400k
6. bbb_30fps_480x270_600k
7. bbb_30fps_640x360_1000k
8. bbb_30fps_640x360_800k
9. bbb_30fps_768x432_1500k
10. bbb_30fps_3840x2160_12000k

Highest quality level: bbb_30fps_3840x2160_12000k, with resolution 3840x2160 and bandwidth 14,931,538 bps (approximately 12 Mbps).

Lowest quality level: bbb_30fps_320x180_200k, with resolution 320x180 and bandwidth 254,320 bps (approximately 200 kbps).

Different quality levels allow adaptive streaming, where the player adjusts the video quality based on the user's network conditions and device capabilities. This ensures a smooth playback experience without buffering or interruptions.

A user starts streaming on a high-speed Wi-Fi network. The player retrieves the highest quality level, such as 3840x2160.

The user moves to a slower mobile network. The player dynamically switches to a lower quality level, such as 320x180, to prevent buffering.

Different quality levels are necessary to adapt to varying network conditions and device capabilities, ensuring seamless playback. For example, a player might switch to a lower quality when the network speed drops or to a higher quality on a fast connection.

TASK 2

1. https://dash.akamaized.net/akamai/bbb_30fps/bbb_30fps_3840x2160_12000k/bbb_30fps_3840x2160_12000k_8.m4v

2. the file format is MP4 (specifically .m4v for video in this case).

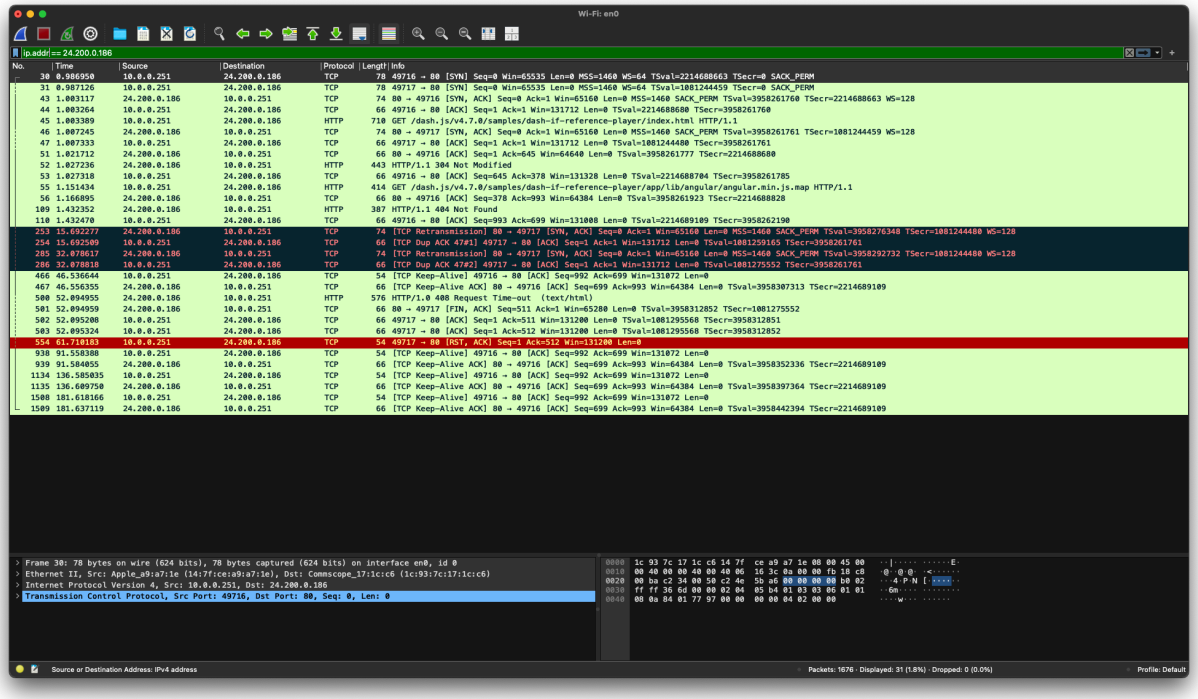
3. Segment duration = duration / timescale so 15360 /122880 = 8.

   The duration of this video segment is 8 seconds.

4. Advantage:
   Longer segments (ex: 10 seconds) reduce the number of HTTP requests, lowering overhead and improving efficiency on stable networks.

   Disadvantage:
   Longer segments delay quality adaptation. If the network speed suddenly drops, the player may buffer or stall because it cannot switch to a lower quality until the next segment.

TASK 3


Wi-Fi: en0
ip.addr == 24.200.0.186
No. Time Source Destination Protocol Length Info
30 0.986950 10.0.0.251 24.200.0.186 TCP 78 49716 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 TSval=2214688663 TSecr=0 SACK_PERM
31 0.987126 10.0.0.251 24.200.0.186 TCP 78 49717 → 80 [SYN] Seq=0 Win=65535 Len=0 MSS=1460 WS=64 TSval=1081244459 TSecr=0 SACK_PERM
43 1.003117 24.200.0.186 10.0.0.251 TCP 74 80 → 49716 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM TSval=3958261760 TSecr=2214688663 WS=128
44 1.003264 10.0.0.251 24.200.0.186 TCP 66 49716 → 80 [ACK] Seq=1 Ack=1 Win=131712 Len=0 TSval=2214688680 TSecr=3958261760
45 1.003389 10.0.0.251 24.200.0.186 HTTP 710 GET /dash.js/v4.7.0/samples/dash-if-reference-player/index.html HTTP/1.1
46 1.007245 24.200.0.186 10.0.0.251 TCP 74 80 → 49717 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM TSval=3958261761 TSecr=1081244459 WS=128
47 1.007333 10.0.0.251 24.200.0.186 TCP 66 49717 → 80 [ACK] Seq=1 Ack=1 Win=131712 Len=0 TSval=1081244480 TSecr=3958261761
51 1.021712 24.200.0.186 10.0.0.251 TCP 66 80 → 49716 [ACK] Seq=1 Ack=645 Win=64640 Len=0 TSval=3958261777 TSecr=2214688680
52 1.027236 24.200.0.186 10.0.0.251 HTTP 443 HTTP/1.1 304 Not Modified
53 1.027318 10.0.0.251 24.200.0.186 TCP 66 49716 → 80 [ACK] Seq=645 Ack=378 Win=131328 Len=0 TSval=2214688704 TSecr=3958261785
55 1.151434 10.0.0.251 24.200.0.186 HTTP 414 GET /dash.js/v4.7.0/samples/dash-if-reference-player/app/lib/angular/angular.min.js.map HTTP/1.1
56 1.166895 24.200.0.186 10.0.0.251 TCP 66 80 → 49716 [ACK] Seq=378 Ack=993 Win=64384 Len=0 TSval=3958261923 TSecr=2214688828
109 1.432352 24.200.0.186 10.0.0.251 HTTP 387 HTTP/1.1 404 Not Found
110 1.432470 10.0.0.251 24.200.0.186 TCP 66 49716 → 80 [ACK] Seq=993 Ack=699 Win=131008 Len=0 TSval=2214689109 TSecr=3958262190
253 15.692277 24.200.0.186 10.0.0.251 TCP 74 [TCP Retransmission] 80 → 49717 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM TSval=3958276348 TSecr=1081244480 WS=128
254 15.692509 10.0.0.251 24.200.0.186 TCP 66 [TCP Dup ACK 47#1] 49717 → 80 [ACK] Seq=1 Ack=1 Win=131712 Len=0 TSval=1081259165 TSecr=3958261761
285 32.078617 24.200.0.186 10.0.0.251 TCP 74 [TCP Retransmission] 80 → 49717 [SYN, ACK] Seq=0 Ack=1 Win=65160 Len=0 MSS=1460 SACK_PERM TSval=3958292732 TSecr=1081244480 WS=128
286 32.078818 10.0.0.251 24.200.0.186 TCP 66 [TCP Dup ACK 47#2] 49717 → 80 [ACK] Seq=1 Ack=1 Win=131712 Len=0 TSval=1081275552 TSecr=3958261761
466 46.536644 10.0.0.251 24.200.0.186 TCP 54 [TCP Keep-Alive] 49716 → 80 [ACK] Seq=992 Ack=699 Win=131072 Len=0
467 46.556355 24.200.0.186 10.0.0.251 TCP 66 [TCP Keep-Alive ACK] 80 → 49716 [ACK] Seq=699 Ack=993 Win=64384 Len=0 TSval=3958307313 TSecr=2214689109
500 52.094955 24.200.0.186 10.0.0.251 HTTP 576 HTTP/1.0 408 Request Time-out (text/html)
501 52.094959 24.200.0.186 10.0.0.251 TCP 66 80 → 49717 [FIN, ACK] Seq=511 Ack=1 Win=65280 Len=0 TSval=3958312852 TSecr=1081275552
502 52.095208 10.0.0.251 24.200.0.186 TCP 66 49717 → 80 [ACK] Seq=1 Ack=511 Win=131200 Len=0 TSval=1081295568 TSecr=3958312851
503 52.095324 10.0.0.251 24.200.0.186 TCP 66 49717 → 80 [ACK] Seq=1 Ack=512 Win=131200 Len=0 TSval=1081295568 TSecr=3958312852
554 61.710183 10.0.0.251 24.200.0.186 TCP 54 49717 → 80 [RST, ACK] Seq=1 Ack=512 Win=131200 Len=0
930 91.558388 10.0.0.251 24.200.0.186 TCP 54 [TCP Keep-Alive] 49716 → 80 [ACK] Seq=992 Ack=699 Win=131072 Len=0
939 91.584055 24.200.0.186 10.0.0.251 TCP 66 [TCP Keep-Alive ACK] 80 → 49716 [ACK] Seq=699 Ack=993 Win=64384 Len=0 TSval=3958352336 TSecr=2214689109
1134 136.585035 10.0.0.251 24.200.0.186 TCP 54 [TCP Keep-Alive] 49716 → 80 [ACK] Seq=992 Ack=699 Win=131072 Len=0
1135 136.609750 24.200.0.186 10.0.0.251 TCP 66 [TCP Keep-Alive ACK] 80 → 49716 [ACK] Seq=699 Ack=993 Win=64384 Len=0 TSval=3958397364 TSecr=2214689109
1508 181.618166 10.0.0.251 24.200.0.186 TCP 54 [TCP Keep-Alive] 49716 → 80 [ACK] Seq=992 Ack=699 Win=131072 Len=0
1509 181.637119 24.200.0.186 10.0.0.251 TCP 66 [TCP Keep-Alive ACK] 80 → 49716 [ACK] Seq=699 Ack=993 Win=64384 Len=0 TSval=3958442394 TSecr=2214689109
Frame 30: 78 bytes on wire (624 bits), 78 bytes captured (624 bits) on interface en0, id 0
Ethernet II, Src: Apple_a9:a7:1e (14:7f:ce:a9:a7:1e), Dst: Commscope_17:1c:c6 (1c:93:7c:17:1c:c6)
Internet Protocol Version 4, Src: 10.0.0.251, Dst: 24.200.0.186
Transmission Control Protocol, Src Port: 49716, Dst Port: 80, Seq: 0, Len: 0
0000 1c 93 7c 17 1c c6 14 7f ce a9 a7 1e 08 00 45 00
0010 00 40 00 00 40 00 40 06 16 3c 0a 00 00 fb 18 c8
0020 00 ba c2 34 00 50 c2 4e 5b a6 00 00 00 00 b0 02
0030 ff ff 36 6d 00 00 02 04 05 b4 01 03 03 06 01 01
0040 08 0a 84 01 77 97 00 00 00 00 04 02 00 00
Source or Destination Address: IPv4 address
Packets: 1676 · Displayed: 31 (1.8%) · Dropped: 0 (0.0%)
Profile: Default