

Mobile Video Delivery

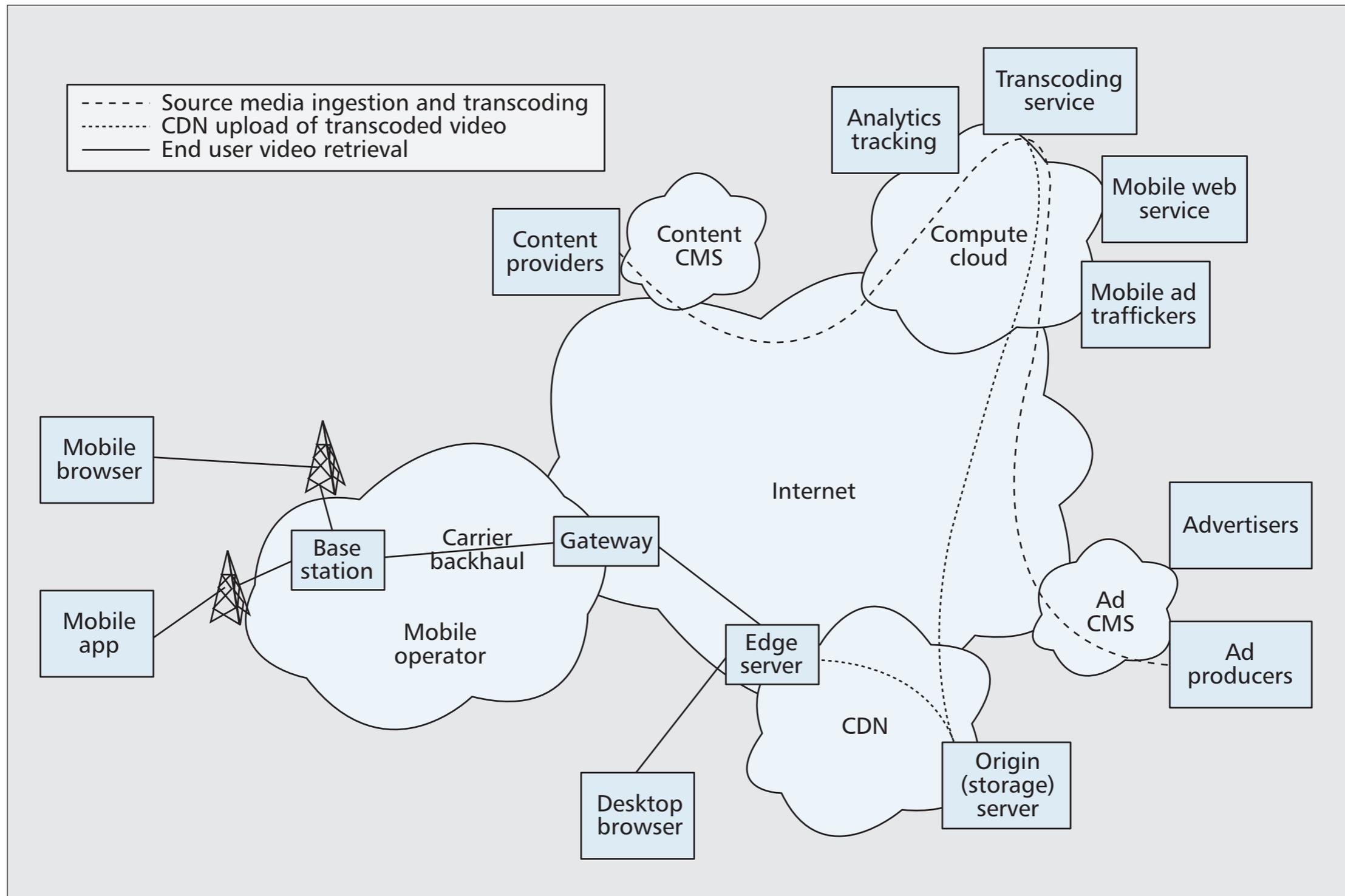


Figure 2. Mobile video delivery network.

Video Delivery Ecosystem

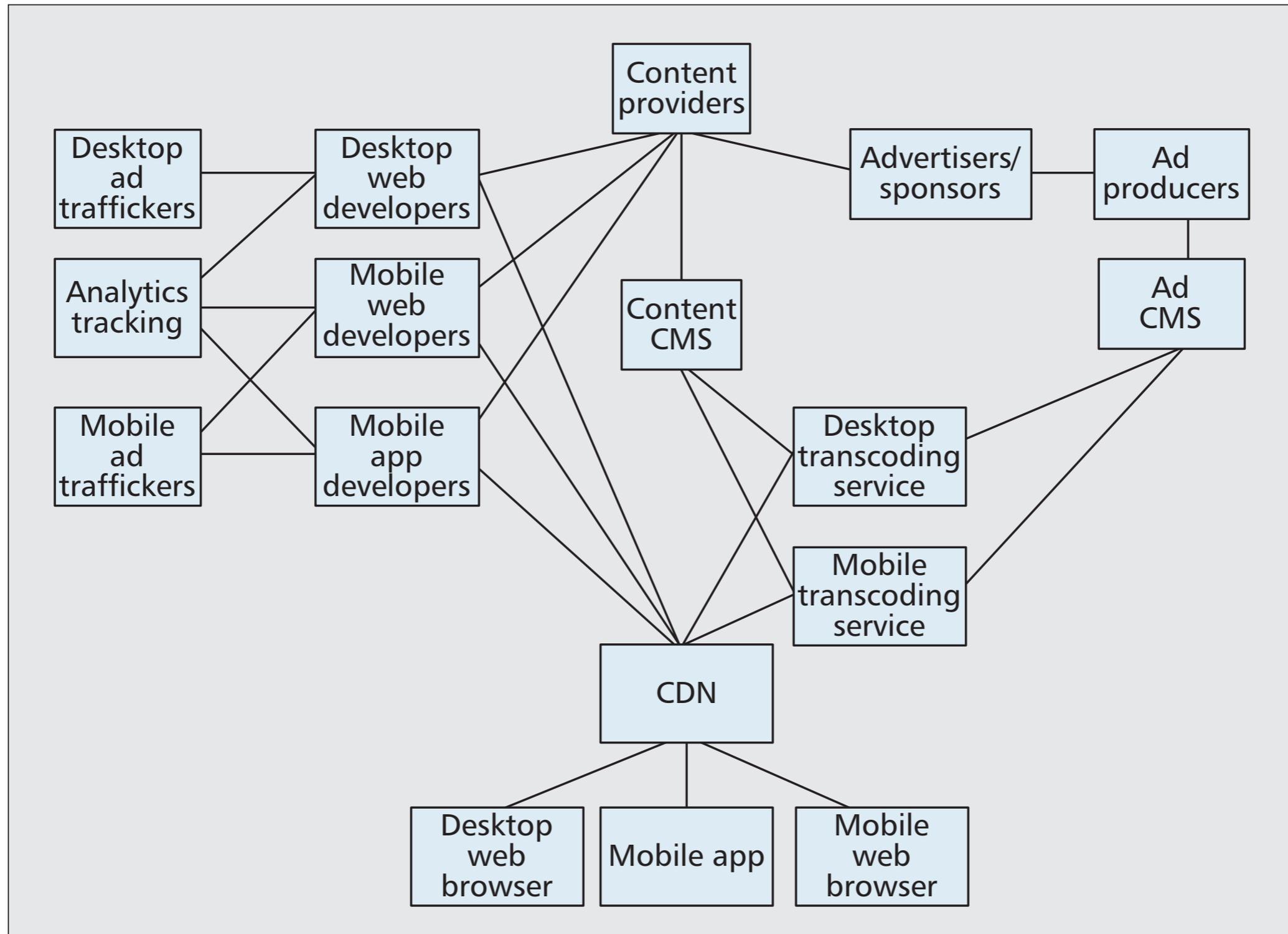
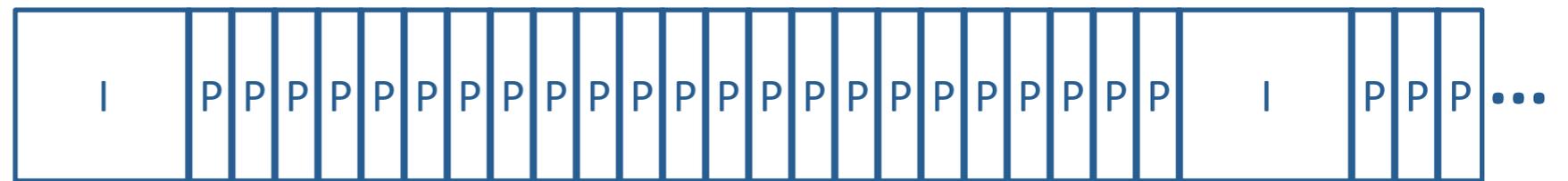


Figure 1. *Video delivery ecosystem.*

Video Representation

- ▶ Video is Compressed using Differential Encodings:
 - key frames: full raster images
 - in-between frames: small changes to key frames

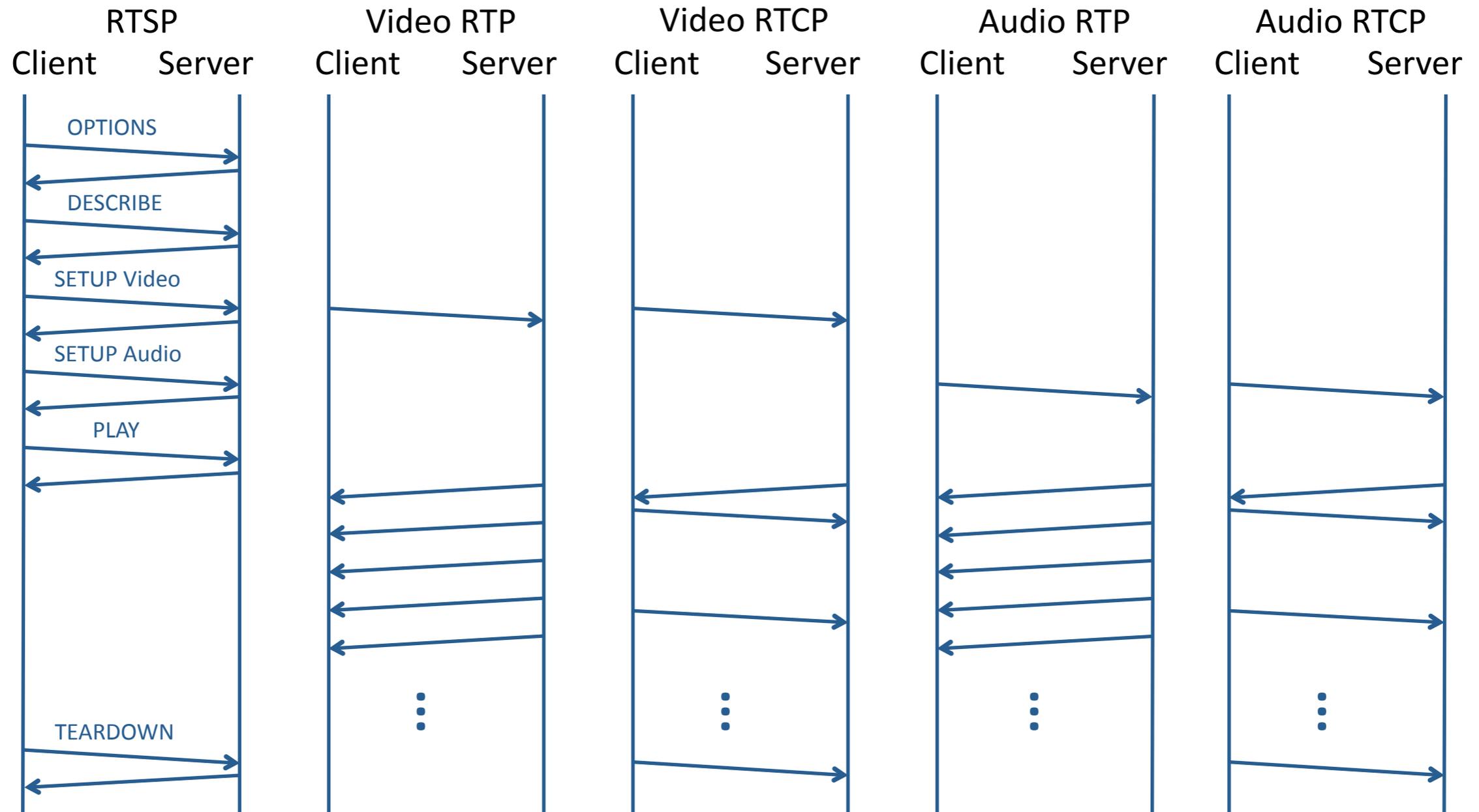


- ▶ MPEG Groups of Pictures (GOPs)
 - I frames: independent key frames
 - P frames: changes relative to the closest prior reference (I or P) frames
 - B frames: changes relative to the closest prior and/or future reference (I or P) frames

Video Delivery

- ▶ Streaming (RTSP/RTP)
 - unreliable (UDP) transport, server-side pacing
- ▶ Straight Download (HTTP)
 - reliable (TCP) transport, no pacing
- ▶ Segmented Delivery (HTTP Progressive Download)
 - reliable (TCP) transport, client-side pacing, using Range GETs or segment files
 - reliable (TCP) transport, server-side pacing

RTSP/RTP/RTCP



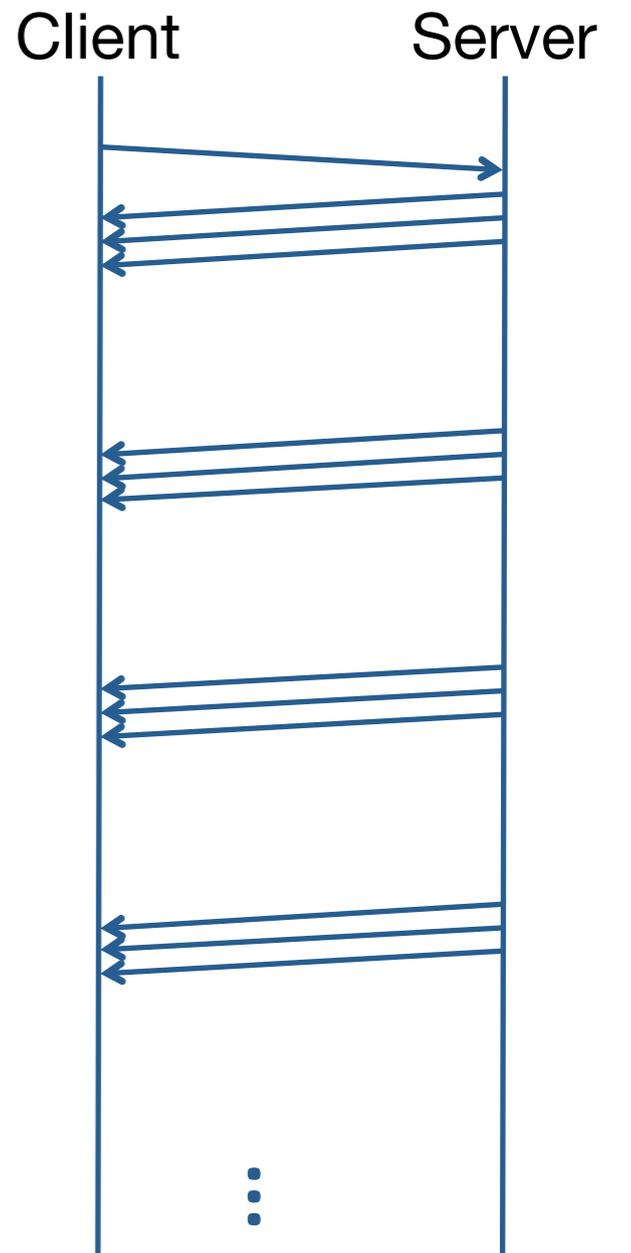
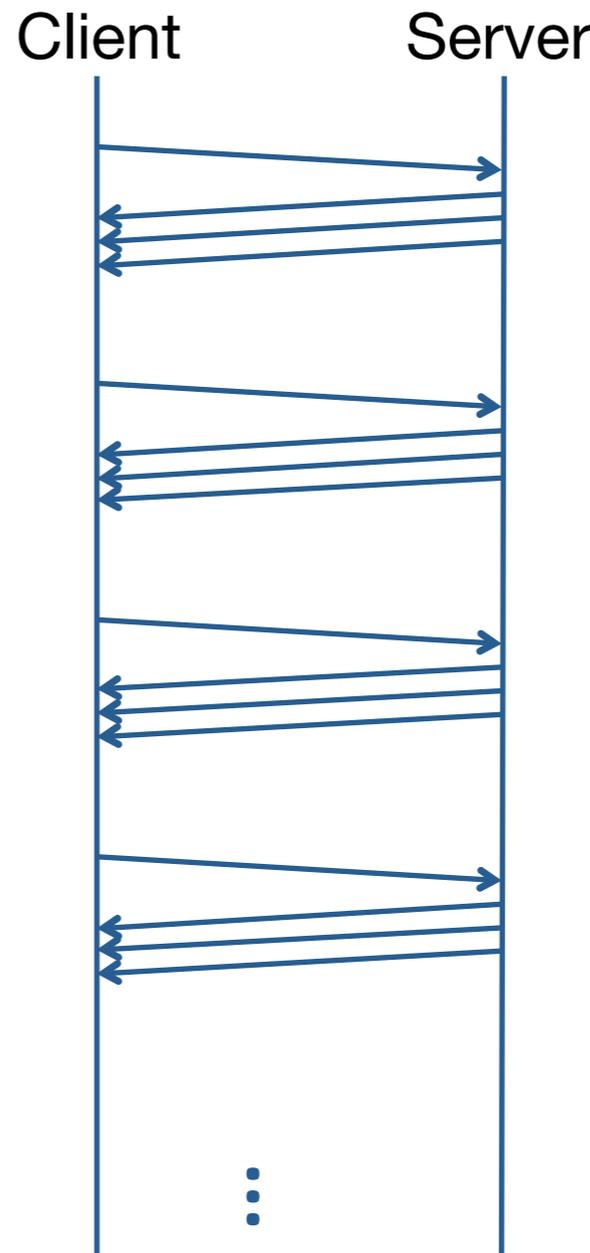
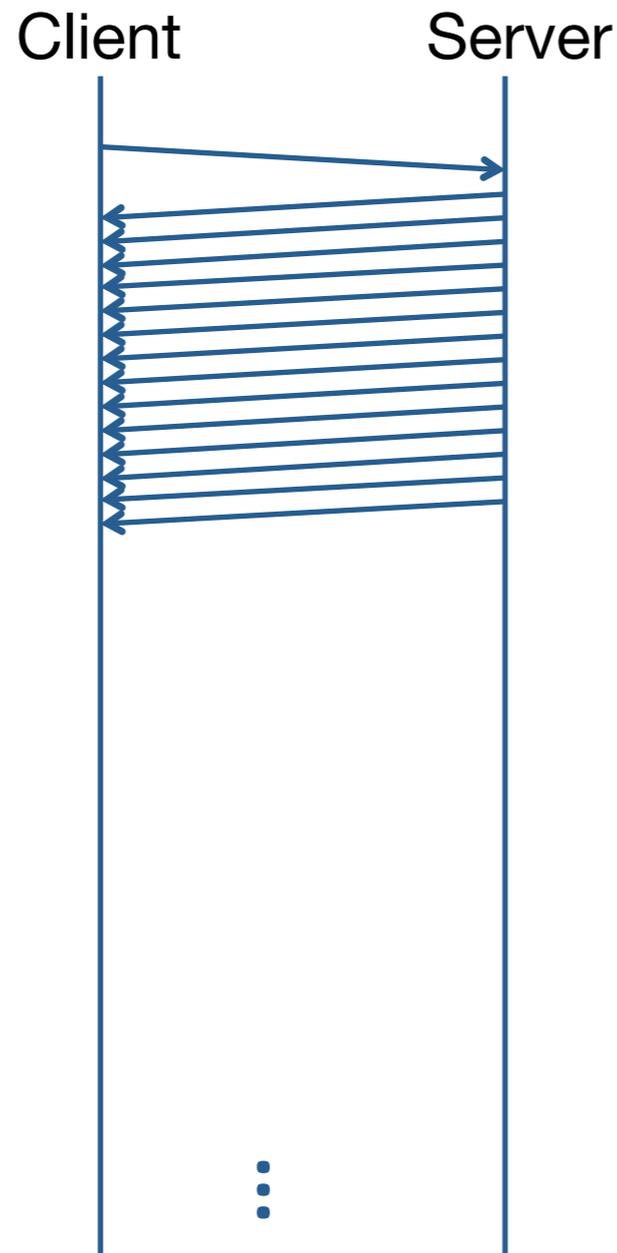
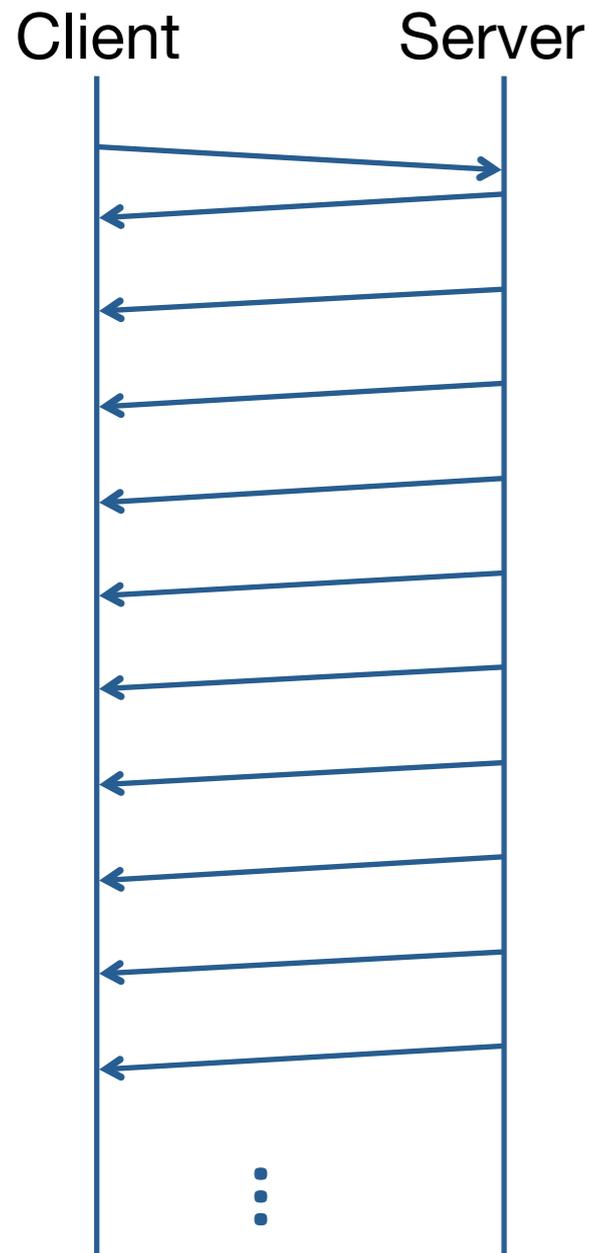
Video Delivery Methods

Streaming

Straight Download

Segmented
Delivery
Client Paced

Segmented
Delivery
Server Paced



Video Metrics

- ▶ **Playback Latency**: initial buffer fill time
- ▶ **Time Shift Latency**: difference from real-time
- ▶ **Playback Artifacts** (Pixelation): missed deadlines
 - late/lost in-between frames
 - late/lost key frames
- ▶ **Playback Stoppages**: buffer under-runs
 - excessive unreliable transport loss/lateness
 - excessive reliable transport retransmission delay