

Video Transmission

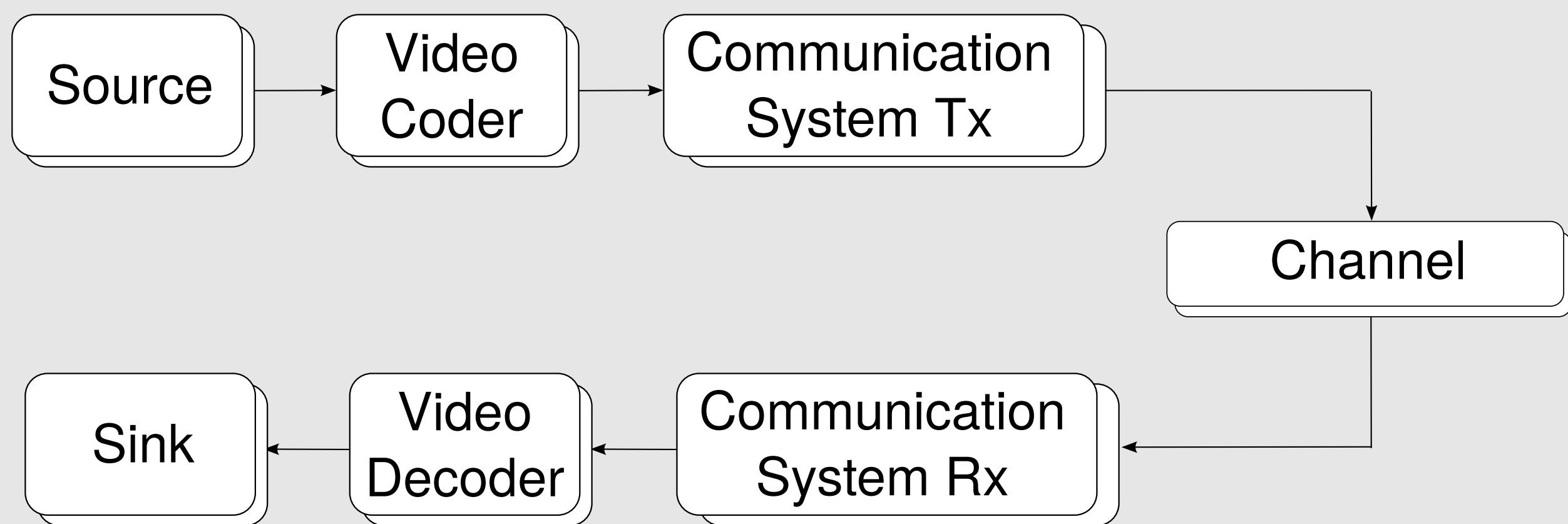
an overview of Video Compression and Communication Systems

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1. Motivation

Video compression and communication

- ▶ Real time data transmission
- ▶ Realistic channel
- ▶ Adaptive system
- ▶ Feedback channel for controlling and management



Classical separation principle

- ▶ Video (source) coding: operate closely to the rate-distortion bound
 - ▶ Communication system: operate closely to the channel capacity
- Assumptions
- (i) long block lengths for source and channel codes
 - (ii) high computational resources and associated delays

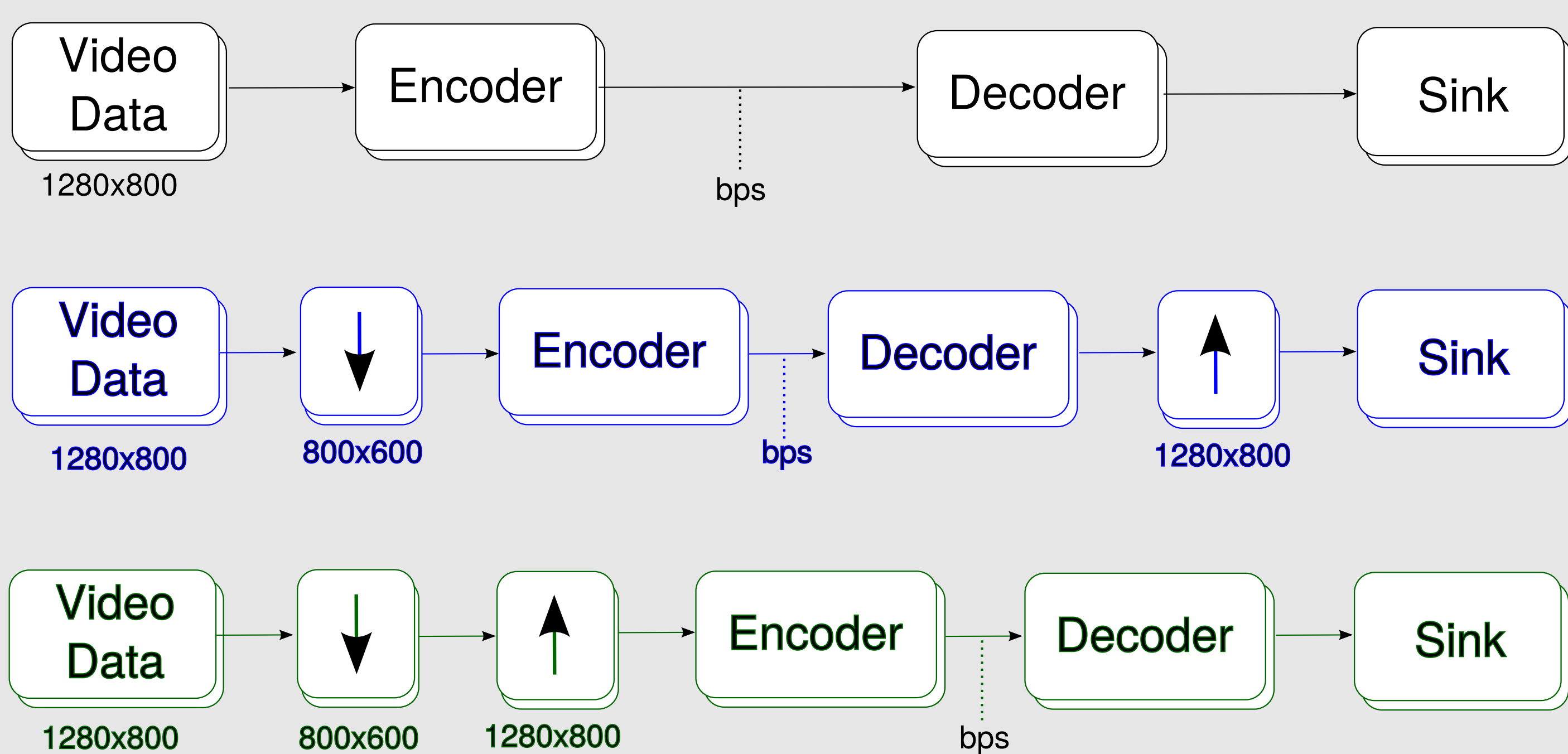
Assumptions do not hold in practice

Goal

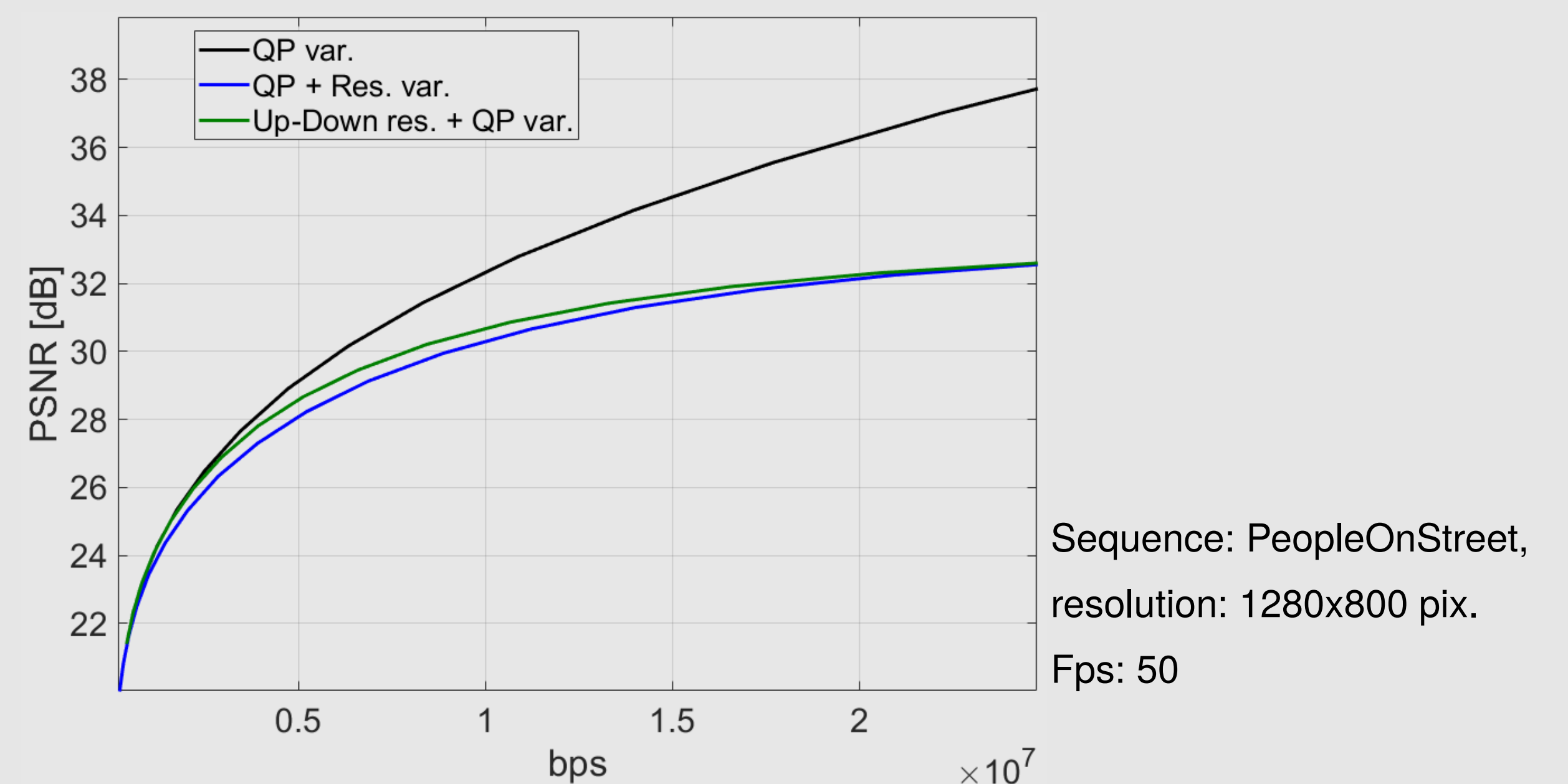
Minimize the end-to-end distortion of the delivered copy of the source under some constraints: bandwidth, transmission power or energy, delay and complexity.

2. Videocoding system: HEVC

- ▶ Adaptive parameters, e.g., space resolution and QP



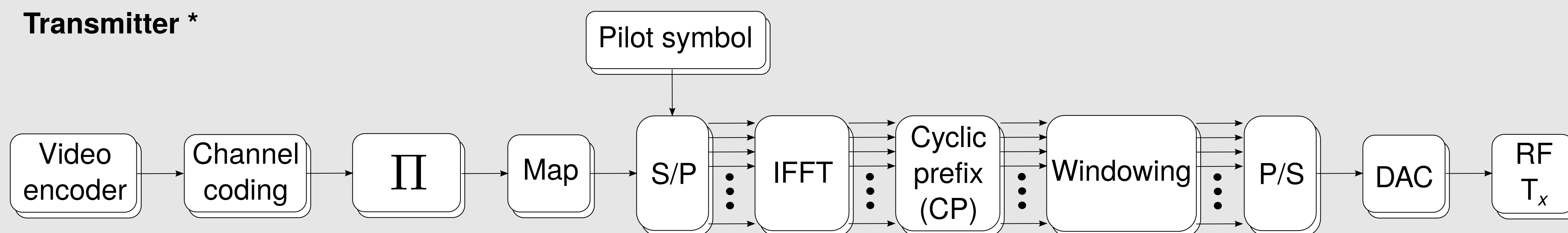
- ▶ PSNR comparison



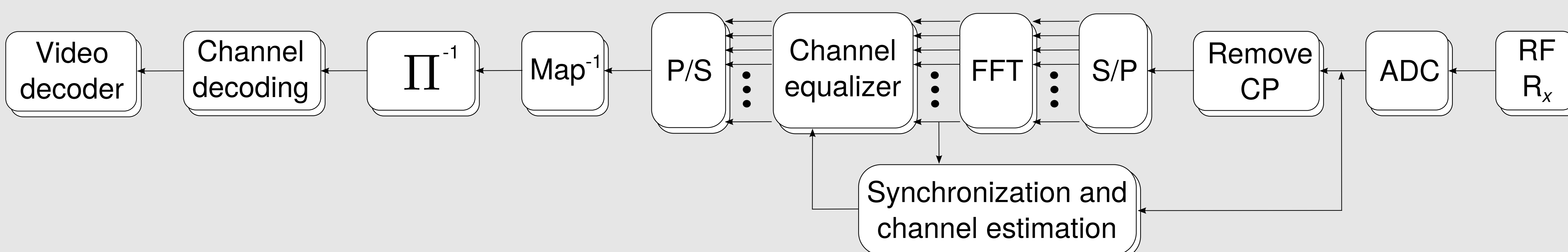
- ▶ Other parameters, e.g., time resolution, GOP structur, etc.

3. Communication system: OFDM block diagram

Transmitter *



Receiver *



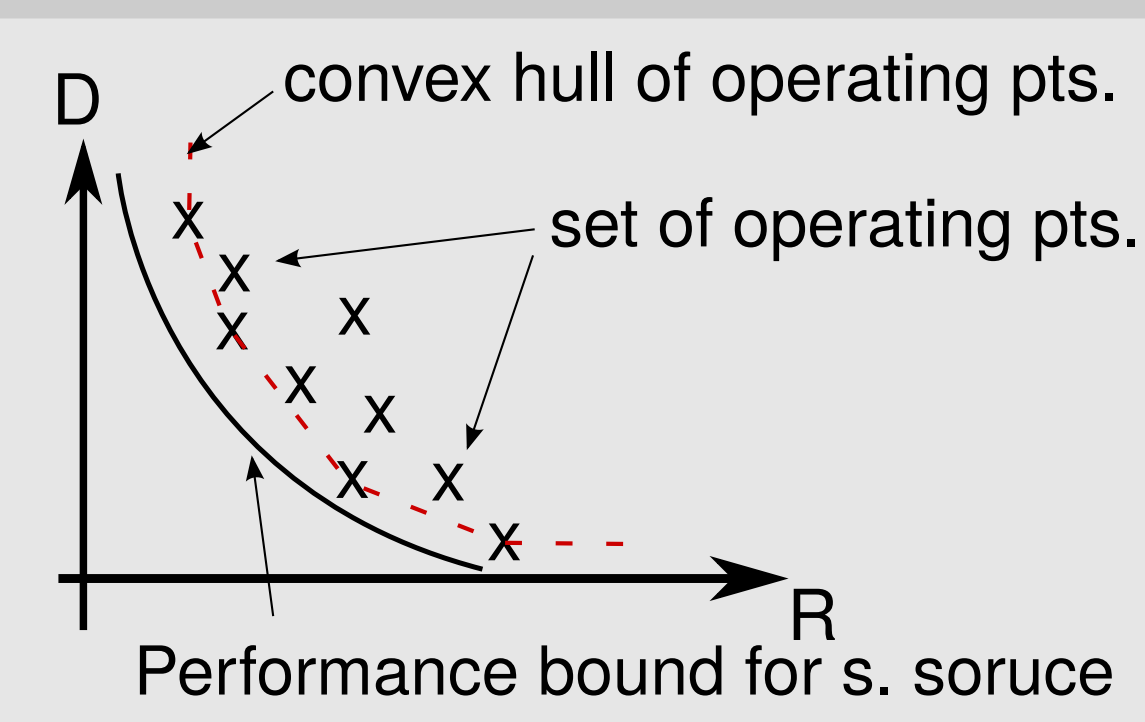
Channel $h(\tau, t)$

Realistic channel, i.e., time/frequency-selective

*Adaptive system

4. Optimization

- ▶ Lagrangian Optimization
- ▶ Dynamic Programming



5. Conclusions and future work

- ▶ min **Expectation[Distortion]** subject to $\left\{ \begin{array}{l} \text{bandwidth,} \\ \text{Tx power,} \\ \text{delay} \end{array} \right\}$ { joint parameters }
- ▶ Search for optimization procedures
- ▶ Bit-sensitivity study