

画像情報特論 (1)

Advanced Image Information (1)

はじめに

Class Overview

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This Year's Schedule

(tentative)

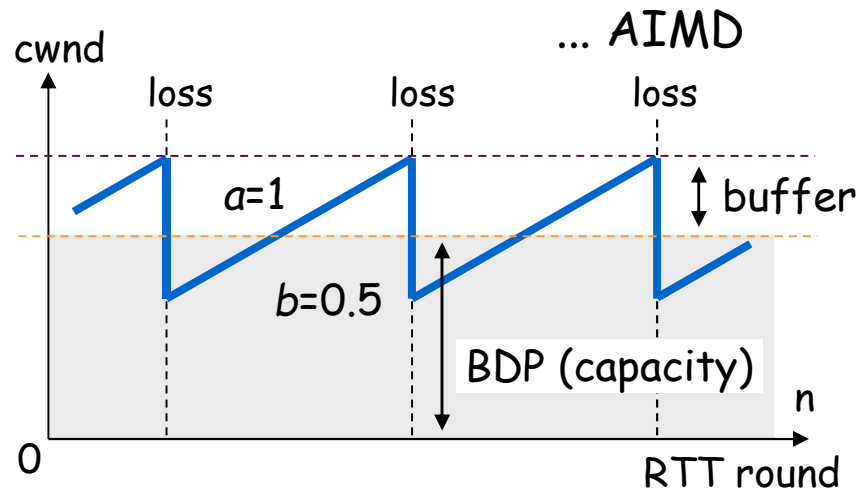
4/08	Class overview
4/15	Video Streaming (1) Streaming, TCP variants
4/22	Video Streaming (2) TFRC
5/06	Video Streaming (3) Wireless
5/13	Video Streaming (4) Protocols
5/20	Video Streaming (5) CDN & P2P
5/27	Video Streaming (6) MPEG-DASH & WebRTC
6/03	Video Compression (1) Basics
6/10	Video Compression (2) H.264/AVC
6/17	Video Compression (3) H.265/HEVC
6/24	Image Processing (1) Super-Resolution
7/01	Image Processing (2) tbd
7/08	Image Processing (3) tbd
7/15	Self-study on CourseN@vi
TBD	Final report

Self-study on CourseN@vi, once or twice

Video streaming (1) TCP/IP

■ Loss-driven

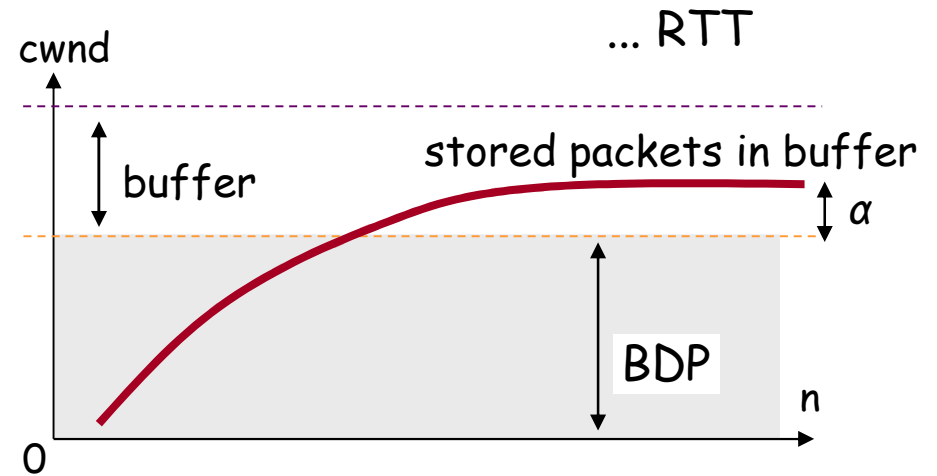
■ Delay-driven



TCP-Reno, High-Speed TCP,
TCP-Westwood, CUBIC-TCP, ...

BDP/Buffer relationship

small buffer \rightarrow \times efficiency
large buffer \rightarrow \times delay



TCP-Vegas, FAST-TCP

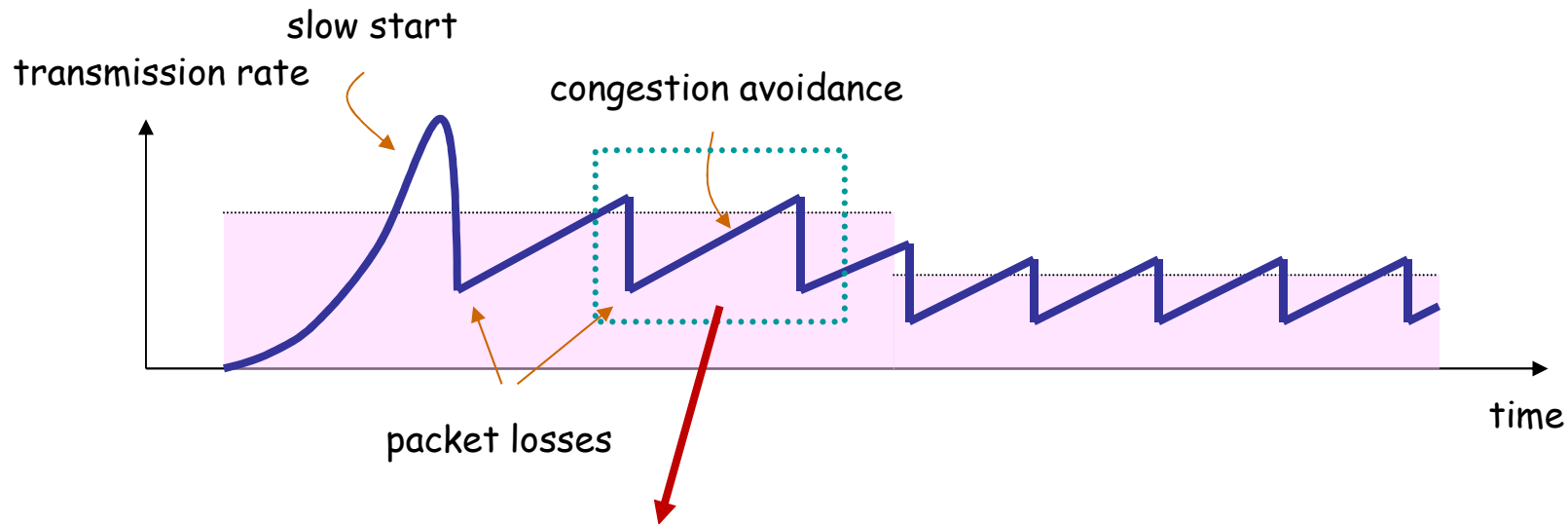
Unfairness by loss-driven TCP

\times friendliness

BDP: Bandwidth-Delay Product

Video streaming (2) TFRC

■ TFRC



Modeling of steady-state
TCP behaviors

$$R = \frac{1}{RTT} \sqrt{\frac{3}{2p}}$$

p: packet loss rate

BDP/Buffer relationship

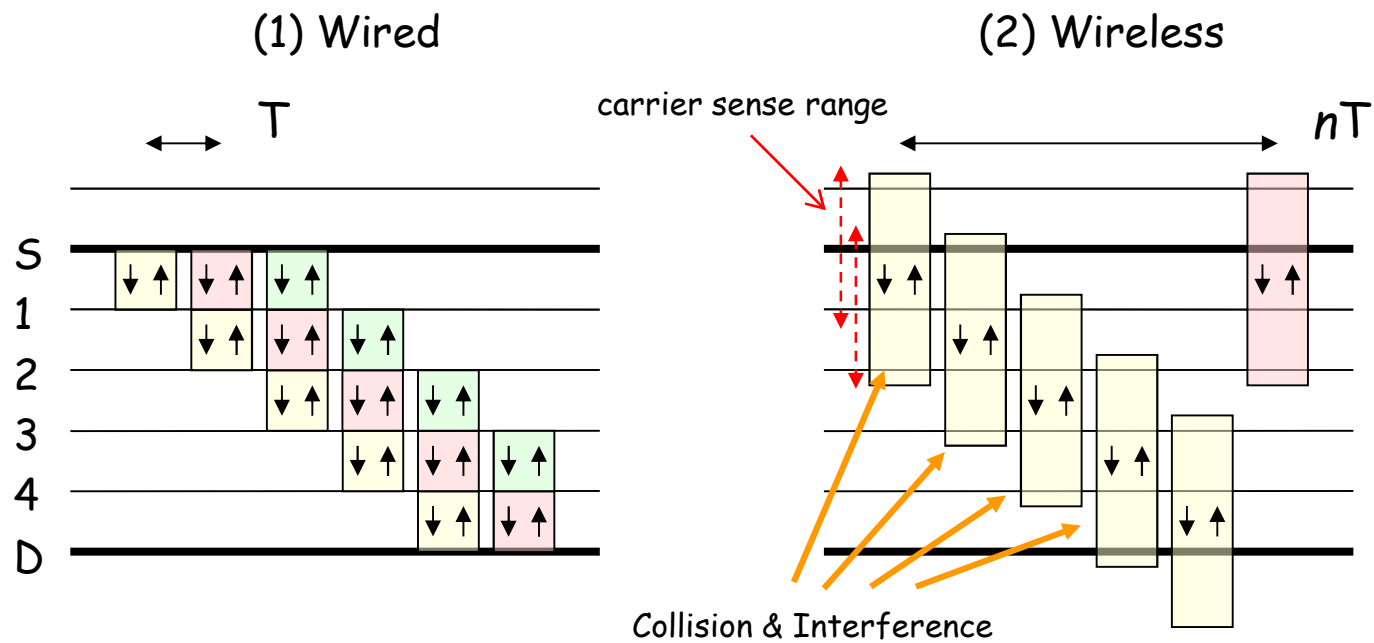
small buffer → × efficiency
large buffer → × delay



TFRC: TCP Friendly Rate Control

Video streaming (3) Wireless

■ Single-Channel Multi-hop Network



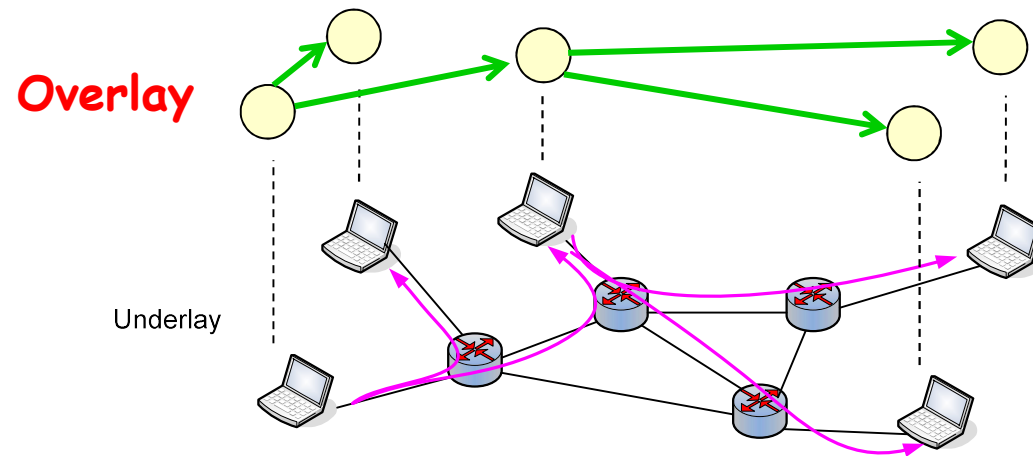
Channel Efficiency = 1



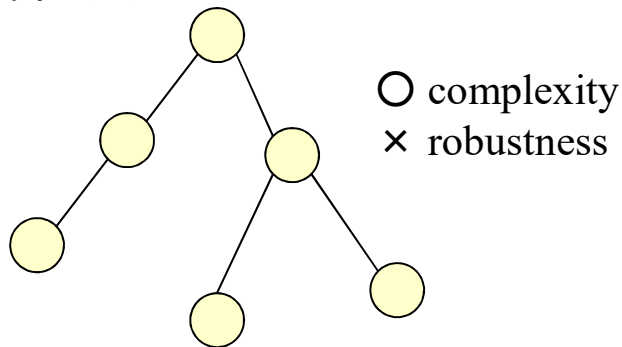
Channel Efficiency = $1/n$
(n : # of multi-hops)

Video streaming (4) CDN, P2P & Cloud

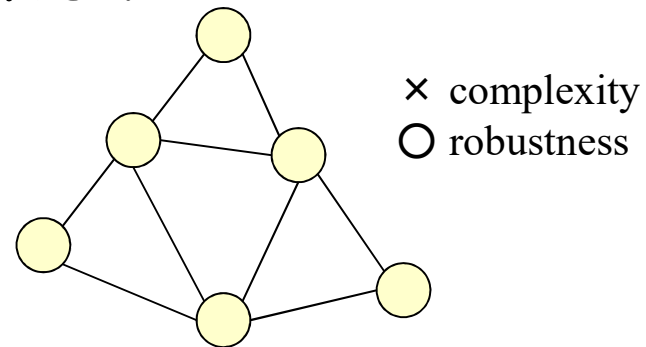
■ Overlay networks



■ tree



■ mesh



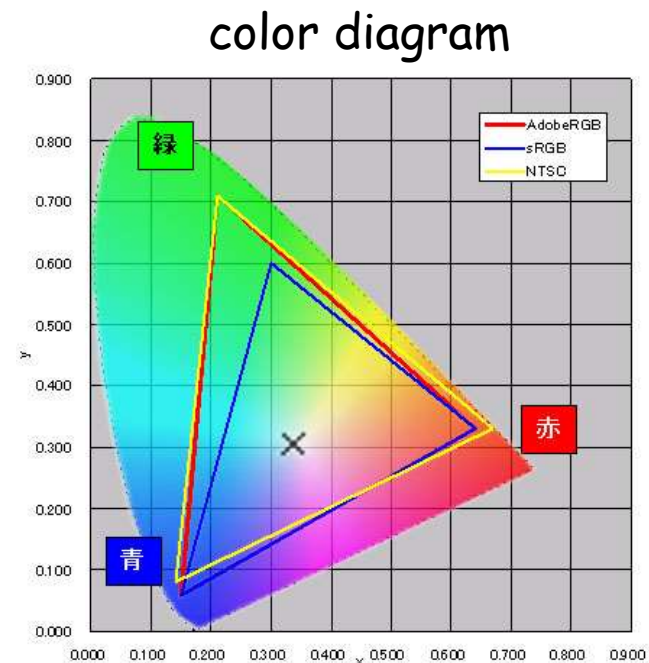
Video Compression (3) H.265

■ H.265/HEVC

- HEVC: High Efficiency Video Coding
- NGVC: Next Generation Video Coding

■ Other topics

- Higher resolution
 - spatial: U-HDTV
 - temporal: 10,000 frames
- Gamut expansion
- High dynamic range
- 3D / freeviewpoint



Super-resolution

■ Super-resolution

- Missing frequency estimation (freq. domain)
- Multiple image approach (registration)
- Single image approach (example-based, data-base)



a: LR Frame 45

b: Data Fused Frame 45

c: Deblurred Frame 45

Handouts

- Check handouts on CourseN@vi.
- (in April) check class web page
 - <http://www.katto.comm.waseda.ac.jp/~katto/Class/>
 - <http://www.katto.comm.waseda.ac.jp/~katto/Class/GazoTokuron/index-e.html>