Best Effort Networks

- Delays - propagation + xmit + queuing + proc
- Loss
- Reordering
- Duplication
Dealing w/ Complexity

- Modularity – Layering
- Protocols → Rules
Layering

C

enet

wifi

modem

S

App
send("s", msg)

Q4,5 → E2E

Q3
Net
Pick next link

Q2
Link
Encapsulatiion

Each layer add/remove its header/trailer
Don’t look at / use payload from higher layers
Link Layer Issues

- Digital $\rightarrow$ Analog $\rightarrow$ Digital
- Framing
- Channel Access
  - Carrier sense
  - Collision Detect
  - TDM
- Error Detection/Correction
D → A → D

Sender
1010

data 1 0 1 0

CLK

Rcyr

0 1 0 1
8x oversampling

S
D → Enc
CLK → PLL

R
Dec

unaligned CLK
Manchester Encoding

0:  

1:  

000

010