# COMN

| | | |
|---|---|---|
| Application | - messages | / HTTP, P2P |
| Transport | - segments | / TCP, UDP |
| Network | - datagrams | / IP |
| Link | - frames | / Ethernet |
| Physical | - bit | |

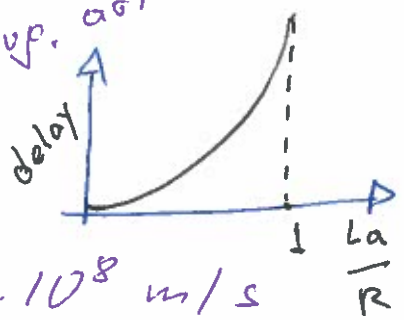
Encapsulation ↓

Bandwidth = link capacity

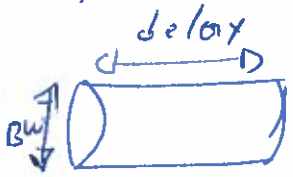
Transmission = $L$ [bits] / $R$ [bits/s]

Statistical (T/F)DM, store & forward

- Nodal processing delay
- Queuing delay → $\frac{La}{R}$ → avg. arival rate
- Transmission delay
- Propagation delay → $\frac{d}{s}$, $s \approx 3 \times 10^8$ m/s




Throughput = $\frac{\text{size}}{\text{time}}$, time = RTT + $\frac{\text{size}}{\text{bottleneck}}$

BWD product: 

→ bits / second

socket - door btw. process & TL protocol

HTTP: TCP, stateless, persistent vs non
- persistent: 1 RTT + 1 RTT (3-way handshake, can send data on 3rd request)
- non: 2 RTT per obj.