Week 4: Bandwidth

1. Introduction
2. Definitions of bandwidth metrics
3. End-to-end measurement approaches
4. Flooding
5. Advanced probing
6. **Conclusion**

Which metric to select?

- Bulk transfer capacity
  - Captures bandwidth of applications with a single large transfer
- Available bandwidth
  - Captures available bandwidth of a path
    - ✓ Some applications use multiple connections
    - ✓ Multiple users share a single Internet access
- Capacity
  - Upper bound on available bandwidth

Measuring bulk transfer capacity

- Method: Flooding
- Considerations
  - Transfer size
  - TCP version and configuration

Measuring available bandwidth

- Method: Flooding
  - Direct measurement of available bandwidth
  - Large overhead (getting worse with higher link capacities)
- Method: Packet pair, self-induced congestion
  - Lower overhead
  - Results not exactly what new connections will get
  - Assumptions don’t always hold

Measuring capacity

- Method: Flooding
  - Measure available capacity
  - High overhead, require repeated measurements
- Method: Packet pairs, size-delay
  - Low overhead
  - As capacity increases, delay diffs are smaller and sensitive to errors