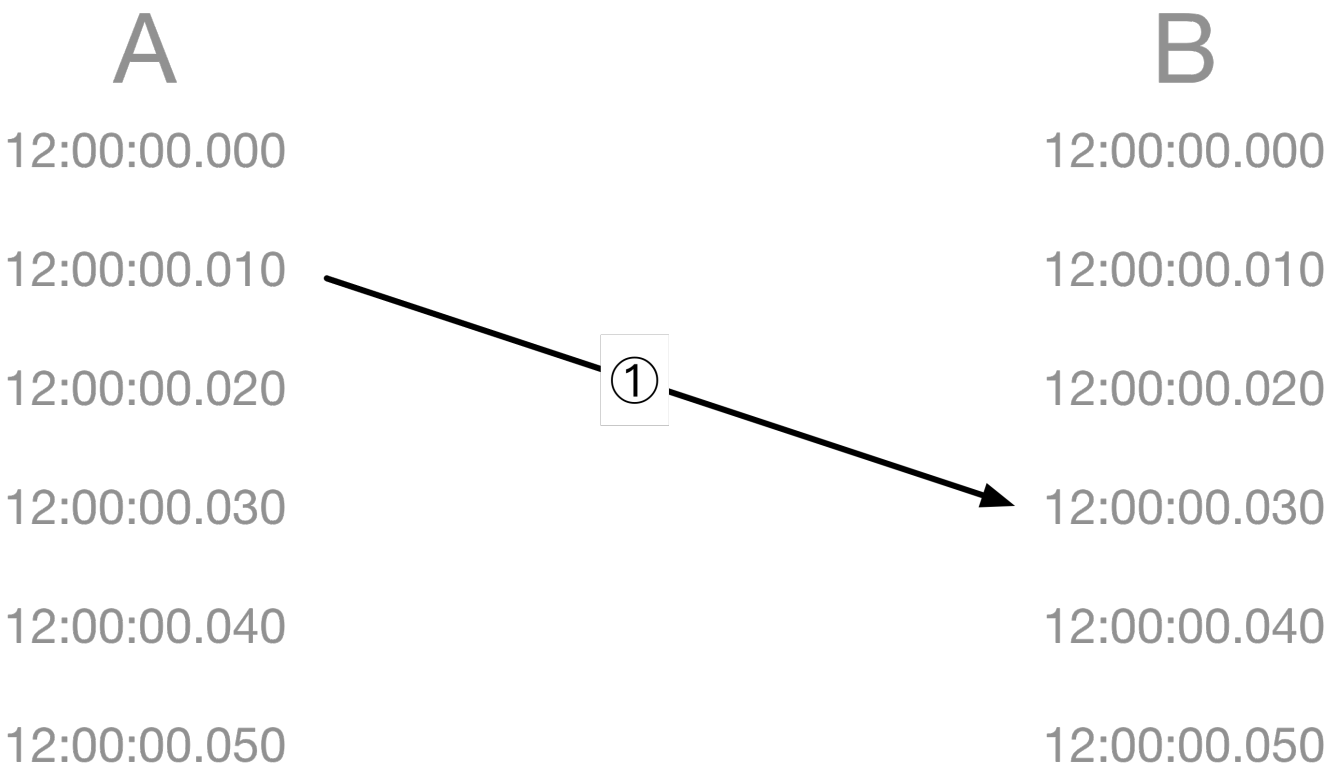
Week 3: Connectivity, losses, latency, and geolocation

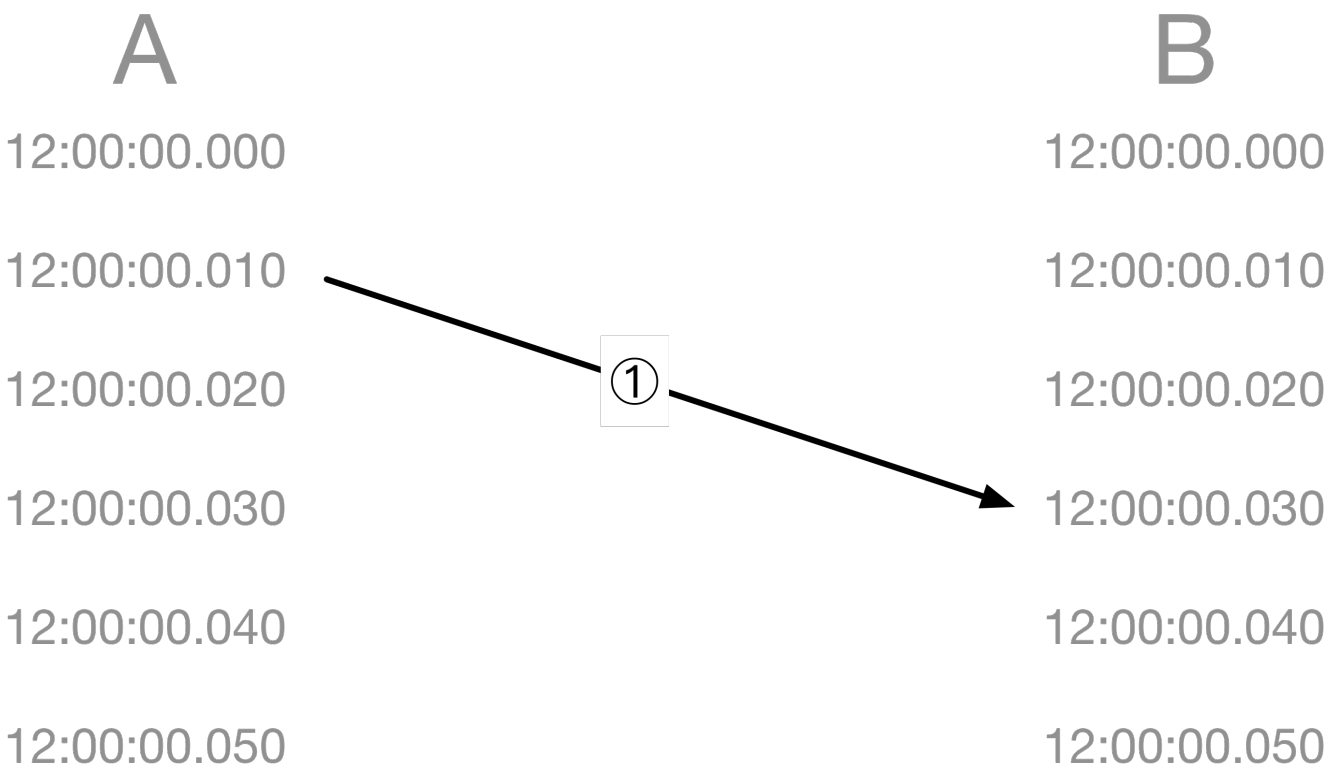
1. Introduction - Ping
2. Connectivity
3. Losses
4. **Latency**
   A. Introduction
   B. Components
   c. **Clocks**
   D. Tools
5. Geolocation
6. Conclusion

Latency - Clocks

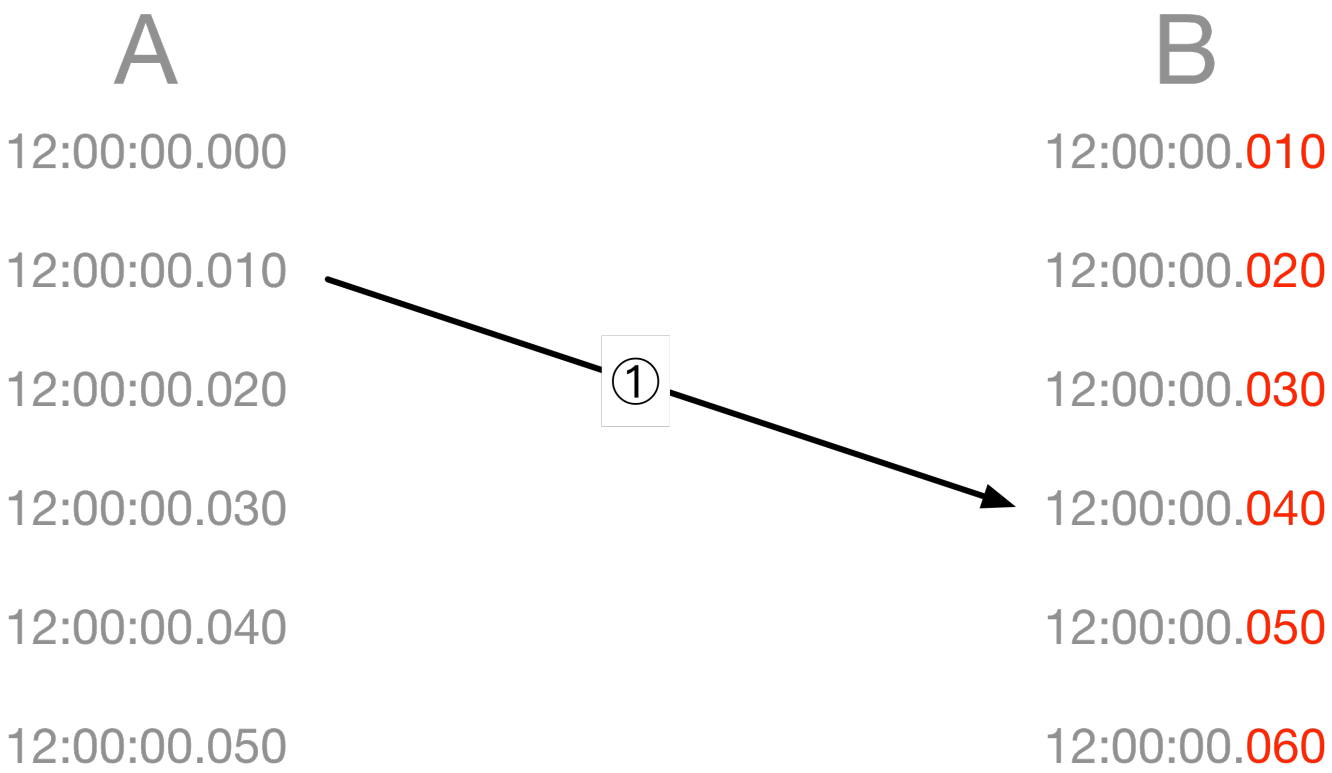
- **Clock offset**
- Clock drift
- Conclusion



L_1 = 30 ms - 10 ms = 20 ms



L_1 = 30 ms - 10 ms = 20 ms?

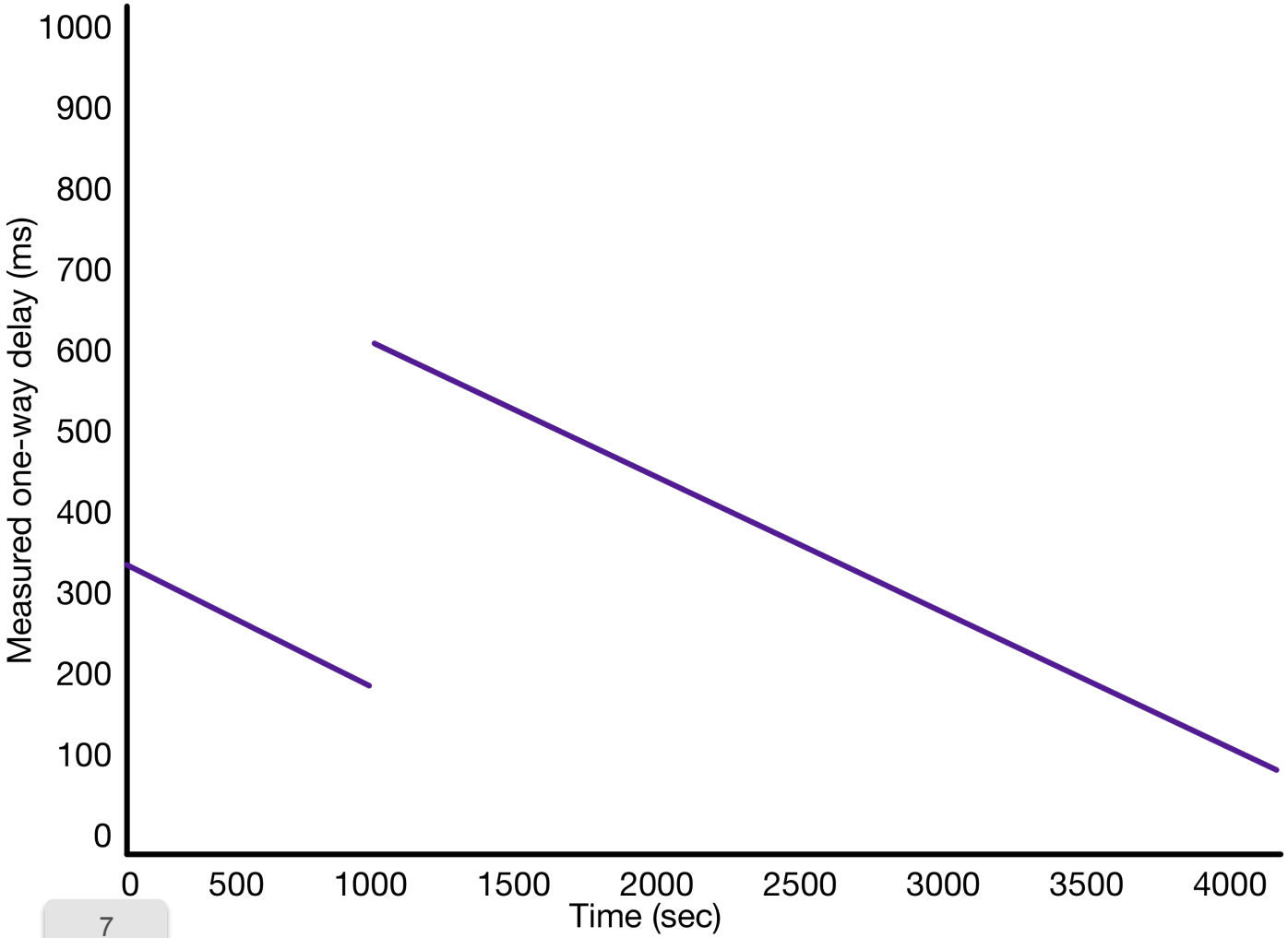


L_1 = 30 ms - 10 ms = 20 ms?

L_1 = 40 ms - 10 ms = 30 ms?

Latency - Clocks

- Clock offset
- **Clock drift**
- Conclusion


Measured one-way delay (ms)
1000
900
800
700
600
500
400
300
200
100
0
0
500
1000
1500
2000
2500
3000
3500
4000
Time (sec)

Latency - Clocks

- Clock offset
- Clock drift
- **Conclusion**
  - ✓ GPS synchronization
    - accuracy 10 to 100 nanoseconds
    - needs GPS receiver, clear view of sky
  - ✓ NTP synchronization: accuracy 1 to 100 milliseconds