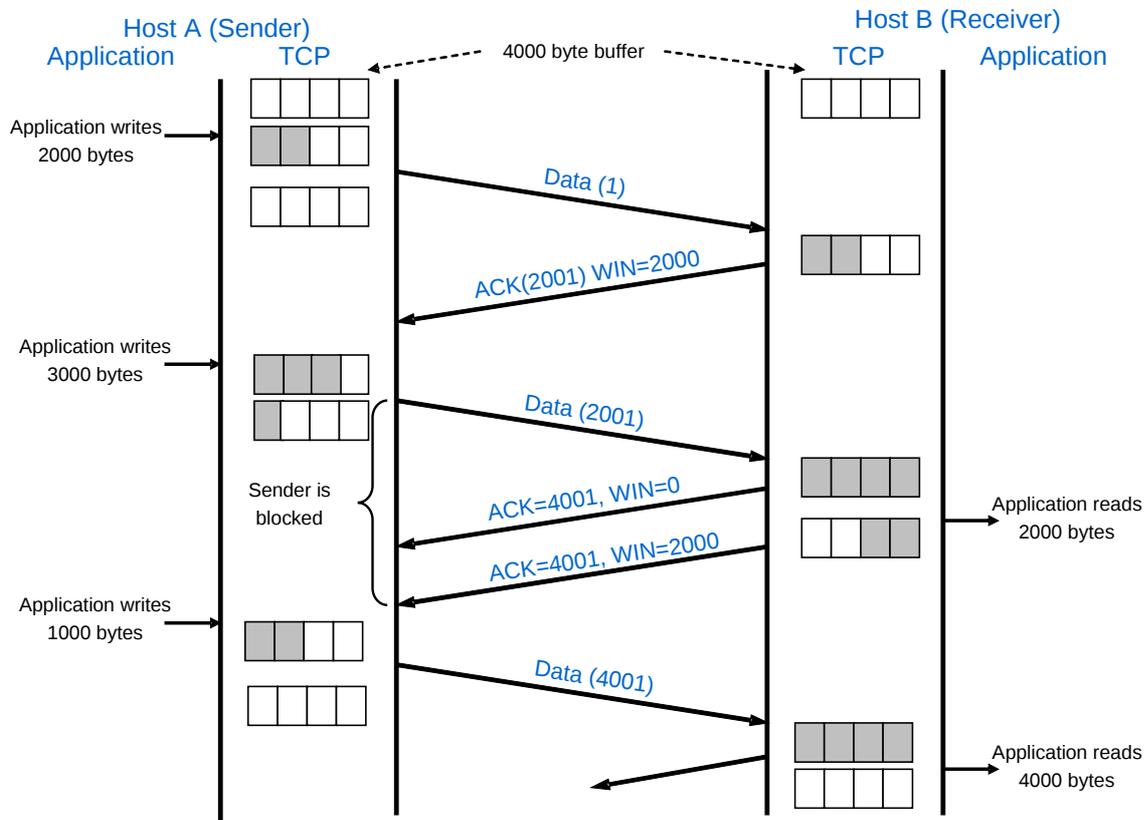


# ITS 323 –TCP PRACTICE

## 1 Questions

Consider the TCP flow control example introduced in the lectures. The transfer of messages is shown below.



### 1.1 Assumptions

Assume the following:

- Application on Host A writes 2000 bytes of data at time 0
- Application on Host A writes 3000 bytes of data at time 5ms
- Application on Host A writes 1000 bytes of data at time 10ms
- Application on Host B reads 2000 bytes of data at time 12ms
- Application on Host B reads 4000 bytes of data at time 16ms
- Propagation delay is 0.5ms
- Data rate is 1000 bytes/ms
- TCP header is 20 bytes

## 1.2 Question 1

For the flow control scenario shown, calculate the total time it takes TCP on Host A to successfully send all of the applications data. That is, the time from when TCP A starts sending, until the time when TCP A receives an ACK for the last byte of data.

### 1.2.1 Hints

It helps to draw the diagram again, but this time showing the transmission time and the propagation time for each message.

Remember a TCP segment contains a header, and optionally some data. An ACK is simply the header, whereas DATA segment is the header plus data.

### 1.2.2 Answer

The total time is 15.54ms. Note that from TCP A's perspective, the data has been successful sent when it receives an ACK from TCP B saying sequence number 6001 is expected.

## 1.3 Question 2

Calculate the throughput achieved by TCP A.

### 1.3.1 Answer

386100 bytes per second