

2016 Question 1.

- a) The IP address of the destination host and the port number of the destination socket.
- b) The applications associated with HTTP require that all application data be received in the correct order and without gaps. TCP provides this service whereas UDP does not.
- c) DNS for ap
 on the transport layer it uses UDP
 the HTTP protocol will use TCP on its transport layer

- d) for non-persistent http: each file need a tcp connection
 for persistent http: one site only connec once.

for non-persistent

150 bit/s \rightarrow 100,000 bits
 \leftarrow 150 bit/s 100,000 bits

for 1 file

| | | |
|------------------|---|--------------------------|
| 三次握手: | $(200/150 \times 3) = 4s$ | |
| 下载一个: | $(100,000/150) = 666.67$ | |
| 四次握手: | $(200/150 \times 2) = 2.67$ | 不考虑 close connection 的时间 |
| ack = | $(200/150 \times 1) = 1.33s$ | |

for 10 files

| | | |
|------------------|---|------------------|
| 三次握手: | $(200/150 \times 3) = 4s$ | 10个握手 15 bit/s = |
| 下载一个 | $100,000/150 = 666.67$ | |
| 四次握手: | $200/150 \times 2 = 2.67$ | |
| ack = | $200/150 = 1.33s$ | |

for persistent

for 1 file

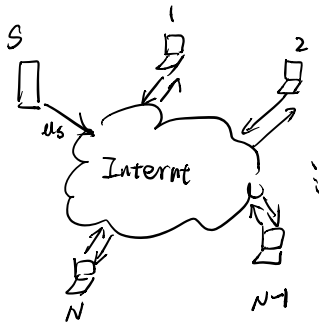
| | | |
|------------------|--|---|
| 三次握手: | $200/150 \times 3 = 4s$ | |
| 下载一个 | $100,000/150 = 666.67$ | $\rightarrow ack = \frac{200}{150} = 1.33s$ |
| 下载 10个 | $100,000 \times 10 / 150 = 6666.67$ | $\rightarrow 10ack = \frac{200}{150} \times 10 = 13.3s$ |
| 四次握手: | $200/150 \times 2 = 2.67s$ | |

persistent will only save 40s

There is no significant performance gains over the non-persistent case.

The data length is far larger than the control packets, the time for send extra data counts for a small part.

e)



$\frac{F}{u_s}$: Time for the server to upload a file

$\frac{F}{d_{\min}}$: the largest time for a peer to download a file

$u_s + \sum_{i=1}^N u_i$: the bandwidth for all the peer and the server. in p2p mode.

$$D_{cs} = \max \left\{ \frac{NF}{u_s}, \frac{F}{d_{\min}} \right\}$$

f)

4 hosts

70% will download from Internet

burst will be 4 Mbit, (4 host request the same time)

all these are not hit.

so it will be $4 \text{ Mbit} / 0.8 = 5 \text{ Mbit}$

the bandwidth will be 5 Mbit/s.

2016 Question 2

(a) Answer True (T) or False (F). Please note that each wrong answer will incur a penalty of 1 mark so guess at your own risk. Please only write the number of the statement and T or F in your answer books.

1. Each TCP socket is identified with a 2-tuple: source port number; and destination port number.

F : socket is identified with a 4-tuple
source ip address, source port number,
dest ip address, dest port number

2. Host A is sending Host B a large file over a TCP connection. Assume Host B has no data to send Host A. Host B will not send acknowledgements to Host A because Host B cannot piggyback the acknowledgements on data.

F:

Piggybacking is an optimization that is used when both sides have to send data to each other so that the receiver, instead of sending two packets i.e., an ACK and a data packet, it just sends one. When the receiver (B) does not have any data to send, it will still send an ACK with the sequence number field containing the next sequence of data it is supposed to send.

3. Suppose Host A is sending Host B a large file over a TCP connection. The number of unacknowledged bytes that A sends cannot exceed the size of the receive buffer.

TRUE

TCP is not permitted to overflow the allocated receiver buffer. Hence when the sender can not send any more data RcvWindow would be 0 and hence all the buffer would have unacknowledged data.

4. Suppose Host A sends one segment with sequence number 38 and 4 bytes of data over a TCP connection to Host B. In this same segment the acknowledgement number must be 42.

相对的, 真的 sequence number 是个连续值

而且 acknowledge number 也是个连续值

但 relative 的会从 0 开始标, 所以有了我看到的数字

只是 ACK number

False

* The acknowledgement number has nothing to do with the sequence number. The ack. number indicates the next sequence number A is expecting from B.

因一开始的 ACK

5. With the SR protocol, the receiver will only acknowledge packets within its current window.

False

SR with sequence number in $[rcv_base - N, rcv_base - 1]$ is correctly received. An ack will be generated.

6. With GBN, it is possible for the sender to receive an ACK for a packet that falls outside of its current window.

the same to SR

TRUE

GBN uses cumulative acknowledgement. Imagine a scenario where ACK1 arrives AFTER ACK2. Once the sender receives ACK2, it would know that both packet1 and 2 were received correctly. So it can remove packet1 and 2 from its window. Now if ACK1 arrives, then ACK1 actually falls outside the current window.