**Unit 2**

**Non-Persistent Connection:** It requires connection setup again and again for each object to send.

**Persistent connection**: It does not require connection setup again and again. Multiple objects can use connection.

Questions : Assume that you have base HTML file with 30 embedded images, images & base file are small enough to fit in one TCP segment. How many RTT are required to retrieve base file & images under-following condition:

(i) Non-Persistent connection without parallel connection

(ii) Non-persistent connection with 10 parallel connection

(iii) Persistent connection without pipe-lining

(iv) Persistent connection with pipe-lining

(Assume RTT dominates all other time)

Explanation :

2RTT is the initial required connection one for TCP connection and one for HTML base file.

Total time = 2RTT + transmit time

(i) Non-Persistent connection with no parallel connection :

Here for each image 2 RTT are required one for TCP connection and one for image to send.

So transmit time for 30 images = 2*(30 RTT) = 60 RTT

Total time = 2 RTT+60 RTT = 62RTT

(ii) Non-persistent connection with 10 parallel connection :

Here 10 images can be send simultaneously.

So for 30 images it required -> 2*(30/10) = 6RTT

Total time = 2 RTT + 6 RTT = 8RTT

(iii) Persistent connection without pipelining :

Here TCP connection is required again and again.

So for 30 images it requires -> 30 RTTs

Total time = 2 RTT + 30 RTT = 32RTT

(iv) Persistent connection with pipe-lining :

Since it is Persistent connection TCP connection is not required again and again.

Pipe-lining means in one packet only images which can fit, can be send.

In Pipe-lining connection we can send all images in 1RTT.

Total time = 2 RTT + 1 RTT = 3RTT