(P22) Problem:

Consider distributing a file of F = 20 Gbits to N peers. The server has an upload rate of us = 30 Mbps, and each peer has a download rate of di = 2 Mbps and an upload rate of u. For N = 10, 100, and 1,000 and u = 300 Kbps, 700 Kbps, and 2 Mbps, prepare a chart giving the minimum distribution time for each of the combinations of N and u for both client server distribution and P2P distribution.

Solution :

Given…..

File size: F=20 Gbits or 20000 Mbps.
Server upload rate: U_s=30 Mbps.
Peer download rate: D_i=2 Mbps.
Number of peers: N=10,100,1000.
Peer upload rate: u=300 Kbps or 0.3Mbps,700 Kbps or 0.7Mbps, 2 Mbps.

Now for N = 10 peer :

Clint-server distribution time T_{cs} = max (NF/U_s , F/D_i)

=(10*20,000/30 , 20,000/2)

=(6,666.67 , 10,000)

=10000 second.

Peer to peer distribution time T_{p2p} = max (F/U_s , F/D_i , $NF/(U_s+N*u)$)

= max (20,000/30 , 20,000/2 , 10*20,000/(30+10*0.3))

= max (666.67 , 10,000 , 6,060.60)

= 10000 second.

Now for N = 100 peer :

Clint-server distribution time T_{cs} = max (NF/U_s , F/D_i)

=(100*20,000/30 , 20,000/2)

=(66,666.67 , 10000)

=66,666.67 second.

Peer to peer distribution time T_{p2p} = max (F/U_s , F/D_i , $NF/(U_s+N*u)$)

= max (20,000/30 , 20,000/2 ,100*20,000/(30+100*0.7))

= max (666.67 , 10,000 , 20,000)

= 20,000 second.

Now for N = 1000 peer :

Clint-server distribution time T_{cs} = max (NF/U_s , F/D_i)

=(1000*20,000/30 , 20,000/2)

=(666,666.67 , 10,000)

=666,666.67 second.

Peer to peer distribution time T_{p2p} = max (F/U_s , F/D_i , $NF/(U_s+N*u)$)

= max (20,000/30 , 20,000/2 , 1000*20,000/(30+1000*2))

= max (666.67 , 10,000 , 9852.23)

= 10,000 second.

Number of peer	Clint server Distribution time (T_{cs})	Peer to peer Distribution time(T_{p2p})
N = 10	10,000 s	10,000 s
N = 100	66,666.67 s	20,000 s
N = 1000	666,666.67 s	10,000 s

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