Bit Torrent :- (Probability of common chunks)

$$P(B \text{ has all the client Alice has}) = \frac{C(N-na, \, nb-na)}{C(N, \, nb)}$$

$N = 10$, $na = 3$, $nb = 5$

$nb \rightarrow$ fixed equal or greater

$$\frac{C(7, 2)}{C(10, 5)}$$

Type 2 when n value is in range -

alice _____ or $l \leq$ Bob _____

____ chunks _____ $\leq$ _____

$$P_{nb} = \left(\sum_{nb=na}^{N-1} \right) \left(\frac{1}{N} \right) \frac{C(N-na, \, nb-na)}{C(N, \, nb)}$$

$nb = 2,3,4$ ←

weight / prior probability

$N = 5$, $na = 2$ $nb = 2, 3, 4$

$$P(2) = \frac{1}{5} \left[\frac{C(3,0)}{C(5,2)} + \frac{C(3,1)}{C(5,3)} + \frac{C(3,2)}{C(5,4)} \right]$$

$$= \frac{1}{5} \; (\text{Ans})$$

$P(2) = $ Ans $\rightarrow$ This is the probability that Bob have all the chunks of Alice -

$$P_{failure} = \left(\sum_{na=0}^{1} \frac{1}{N} P(na) \right)^5$$ Failure case alice has 1 chunk in which its neighbors are interseted

$$P_{success} = 1 - P_{failure}.$$

CDN's | Content distribution networks :-