

Exercise No. 3
Peer-To-Peer Networks
Winter 2016

Exercise 1 *Chord*

Consider a Chord network with n peers. Let the address space be normed to 1. Consider fixed intervals of the address space with the following sizes:

1. $A_1 = \frac{1}{2}$
2. $A_2 = \frac{\log n}{n}$
3. $A_3 = \frac{1}{n}$
4. $A_4 = \frac{1}{n^2}$

Answer the following questions for each of those intervals:

- What is the probability that the interval remains empty?
- What is the probability that the interval has exactly one peer?
- Partition the whole address space into intervals of that size. What is the expected amount of such intervals having exactly one peer?

Exercise 2 *Next neighbour selection*

Having n neighbour peers distributed with a continuous uniform distribution in a region of size d :

- We assume the data is propagated at the velocity of light c . What will be the expected latency if we select a random peer?
- What will be the expected latency if we select the peer with less latency of b randomly chosen peers?
- Assume each hop the latency remains the same. How many hops do we have to do in the first case in order to achieve the same latency as in the second case?
- What does this result say about the Proximity Neighbour Selection?