Christian Schindelhauer Freiburg, 2012-11-07

Exercise No. 2
Peer-To-Peer Networks
Winter 2012

Exercise 1 *Chord*

Consider a Chord network with n peers. Let the address space be normed to 1 (instead of 2^m). 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 *Pastry*

Consider peers with the following identification bits:

0023
0113
0133
0322
1002
1010
1132
1223
2000
2112
2210
2231

1. Illustrate the Pastry network with $M = \emptyset$ and $l = 4$ for $b = 2$ and $B = 4$. Do so by specifying the neighborhood (routingtable) of the nodes 0023, 1132, and 2210.

2. Insert a new node with id 3131 to the network. Update the neighborhood of the nodes you considered in the above task and give the neighbored nodes for the new node. Assume that the new node contacted node 0023 to join the network.