Course on Evolving Internet

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Homework 1 – Due on Thursday September 30, 2021 (23:59 CET)

Problem 1: Mobile IP extended

a) Mobility in today's Internet requires changing IP addresses, which poses problem for ongoing communications and for localization.

First, explain why the Internet is built in such a way where IP addresses are allocated as a function of the location, and not in a flat manner.

Second, explain why changing the IP address poses problem for ongoing communications and for localization.

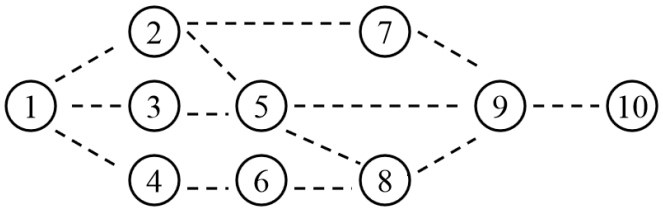
b) Mobile IP is supposed to solve the problem with mobility by allowing the assignment of a permanent IP address to each mobile. Explain briefly how Mobile IP works in the following case: Indirect routing AND the callee and the caller are both outside their home network (visiting two different networks).

c) Why Mobile IP is said to preserve privacy?

Why it is said to be scalable and to respect the incremental deployment requirement?

Problem 2: OSPF vs. OLSR in wireless ad-hoc networks

Consider the following wireless network. Each circle is a mobile node, and each dashed line is a wireless link. We want to connect these devices using a link-state routing protocol so that to form an ad-hoc wireless network.



1. Consider first the well-known OSPF protocol deployed in Internet routers and run it on these wireless nodes.

   a) It is known that each link of this logical topology will be broadcasted by OSPF to all other nodes. What will be then approximately the overhead of OSPF? We consider that a node can reach all its one-hop neighbors with one broadcast and we don't consider the

overhead of the local HELLO messages.

b) Give the final routing tables in the different nodes of the topology. In case of multiple path choices of same length, one of them is randomly chosen.

2. We remove OSPF and we deploy OLSR instead of it. OLSR is also a link-state routing protocol optimized for wireless networks. The main difference between OLSR and OSPF is that only multi-point relays forward the topological information, and only links that connect nodes to their multi-point relays are announced.

   a) Explain how OLSR chooses the multi-point relays and give for each node in the topology its multi-point relays.

   b) What would be the logical topology built by OLSR?

   c) Give the OLSR routing table in each node of the topology.

   d) What will be the overhead of the OLSR routing protocol? Compare it to the one in the previous question. Again, we consider that a node can reach all its one-hop neighbors with one broadcast and we don't consider the overhead of the local HELLO messages.