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# Advanced Networking 2013/14

July 22, 2014, 2<sup>st</sup> session of the summer term

## Instructions:

The solution time is 90min (1h:30). The time you have is limited, but the correction process keeps this into account: in any case sometimes you have to take decisions and include what is more important, leaving out details or less important issues.

**The correction of the exam and the oral will be published on the course web site within Thursday 24. The orals will be Friday and Monday, if you have special needs send me an e-mail with the request and motivation.**

**Question 1:** Consider OSPF. Define formally the methodology to update the path cost to reach a given node  $j$  from node  $i$  (the node running Dijkstra), when the last node added to the reachability set is  $k$ .

**Question 2:** What is the “count to infinity” problem with Bellman-Ford routing algorithms? How is it solved in RIP?

**Question 3:** TCP is a dynamic window protocol that guarantees reliability, flow and congestion control:

1. What is the receiver window (rwn) and how is it computed?
2. What is the congestion window (cwn) and how is it computed?
3. How does TCP decide the transmission window size (txw)? When is txw computed?
4. Can the Fast Retransmit algorithm be used on the first segment of a connection? And on the last?
5. What is the delayed ACK option and why was it introduced in TCP?
6. Consider a modern TCP implementation with FR/FR algorithms. During a long file transfer, in a moment when  $cwn=12$ , the network drops the first, third and eleventh segments (name segments from the first in the window  $S_1, S_2, \dots$ ); draw and explain the packets exchange between the two TCP entities until the Fast Recovery is successfully completed.

**Question 4:** Describe the main logical entities involved in the SIP protocol, and the main methods available for the management of sessions.

**Question 5:** Explain in simple words the principles of operation of the Internet Group Management Protocol (IGMP).