Exercise Multimedia Technology WS 2004/2005

Sheet 9 (January 14th 2005)

9.1 Desert Dwellers

The desert dwellers of Zarkotiens live in scattered oases. Since traveller cannot spend the night in the desert, they must arrive at an oasis every evening. They need one day to travel between different oases. All oases reachable from an oasis A in one day are called neighbors of A.

1. Explain how the regional stations can achieve shortest paths to all oases of Zarkotiens by means of message exchanges between adjacent oases in an iterative process? Describe the exchange of messages according to the Routing Information Protocol (RIP).

2. Every year, the royal court of Zarkotiens award some dwellers the badge of honor. Therefore, these dwellers travel along a path to the royal court visiting different oases en route. The gateways through which such travellers arrive are called gateways of honor. On the next day, they leave an oasis through so-called royal gateways.

   By means of which procedures can messages of the king diffused optimally, i.e., on the shortest path with least message duplicates?

   (a) Duplicates of arriving messages are sent to all adjacent oases except the one the message was received from.

   (b) Messengers with duplicated messages are sent to adjacent oases on paths going through royal gateways.

   (c) Messengers with duplicated messages are sent to adjacent oases on paths going through gateways of honor.

(d) Messengers with duplicated messages are sent to adjacent oases on paths going through royal gateways but not through gateways of honor.

(e) To avoid unnecessary errands, adjacent oases have to agree which oasis forwards incoming messages.

(f) The royal court of Zarkotiens itself is responsible for message diffusion since oases alone have not enough information to achieve a complete and optimal solution.

3. Do you know a protocol that is similar to the one used in 2?

4. Do you see any problems if the currently used method is expanded to enable travelling to other countries? Describe a solution that can be introduced according to the Internet.

9.2   Full Topology Routing

The Routing Information Protocol (RIP) is based on a broadcast protocol in which adjacent gateways exchange routing table information (address, distance) every 30 s. Normally, the routing decision depends on the hop counter (=number of intermediate stops until the destination network is reached). If a specific network is unreachable, a maximum value of 16 will be used. An entry of the routing table consists of destination address, costs (1-16), next node along the path, and special used timers.

Consider the following topology:
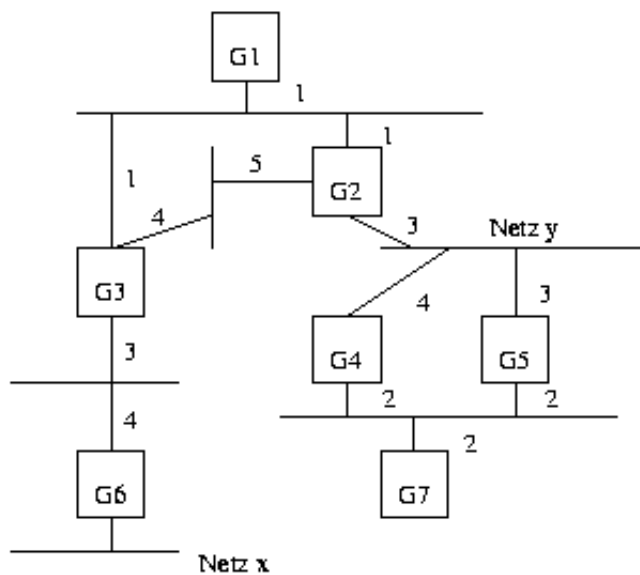
1. First of all, each network is in an initialization state, i.e., each gateway only knows from the network it is connected to. On each edge in the figure, the costs of the connection is denoted. How long does it takes until gateway G7 knows the distance to network X.

2. What happens if gateway G2 loses the connection to network Y shortly after it sent the message (Y, 1) to G1? Which message does gateway G2 send 60 s later?

9.3   Multicast

Describe the term Multicast. Give two examples where multicast transmissions are preferable among other kinds of transmissions.