TCP/IP Networking, 2018, Quiz 4

Use the separate answer sheet to return your answers. Do not return this sheet. We recommend that you first write your tentative answers on this sheet. In a second phase, when you are certain about your answers, you can mark them on the answer sheet.

For each question there is exactly one correct answer. If the good answer and only the good answer box is marked $\Rightarrow$ +1 point. If one bad answer box is marked and no other box is marked $\Rightarrow -\frac{1}{3}$ point. If 0 or more than 1 answer box is marked $\Rightarrow$ 0 point.

Question 1   Say what is true about Software Defined Networking:

1. It is the generic name given to methods, such as OSPF, that use distributed computations in routers.

2. It is the name given to methods that allow a central controller to compute forwarding rules and send these rules to switches or routers.

A Both.   B 1 and not 2.   C None   D 2 and not 1.

Question 2   Say which is true about Per-Flow Load Balancing.

A It occurs when routers have multiple next hops to the same destination; routers identify which packets belong to the same TCP connection by looking at source and destination IP addresses and port numbers and send packets of the same TCP connection to the same next hop.

B It is an extension of OSPF where routers may have only one next hop to every destination but where the computed paths are not necessarily the shortest; in contrast, paths are chosen such that traffic is balanced on the network links.

C It is an extension of OSPF where routers may have only one next hop to every destination but where the link costs are constantly adjusted such that the resulting shortest paths result into balanced traffic on the network links.

D It occurs when routers have multiple next hops to the same destination; routers identify which packets belong to the same flow by looking at source and destination MAC addresses and send packets of the same flow to the same next hop.

Question 3   Say what is true in steady-date (i.e., after convergence) for an OSPF domain with one single area:

1. All routers have the same information in their Link State Database.

2. All routers have the same shortest paths to all destinations.

A 2 and not 1.   B Both.   C 1 and not 2.   D None

**Question 4**   In which case does every router have a map of the entire network ?

A Both with a distance vector routing protocol and with OSPF, single area.
B OSPF, multiple areas.
C With a distance vector routing protocol.
D OSPF, single area.

Question 5   A link failure occurs in an OSPF network with a single area. Say what is true.

[A] Routers that are adjacent to the failed link detect the failure, compute new routes to all destinations using Dijsktra's algorithm and send to their neighbours the new values of the distances to all destinations; this eventually triggers recomputation of distances in all routers.

[B] Routers that are adjacent to the failed link detect the failure by means of the hello or BFD protocol and flood updated Link State Advertisements to the entire area.

[C] All routers eventually detect the failure by means of the hello or BFD protocol and resynchronize their link state databases with their neighbours; after synchronization, link state advertisements are flooded and new routes are computed using Dijkstra'a algorithm.

[D] All routers eventually detect the failure by means of the hello or BFD protocol and compute new routes using Dijksra's algorithm.

Question 6   The figure shows an OSPF domain with two non backbone areas (areas 1 and 2) and one backbone area (area 0). Network n is directly attached to router G in area 2. How does OSPF at router A in area 1 obtain its distance to n ?
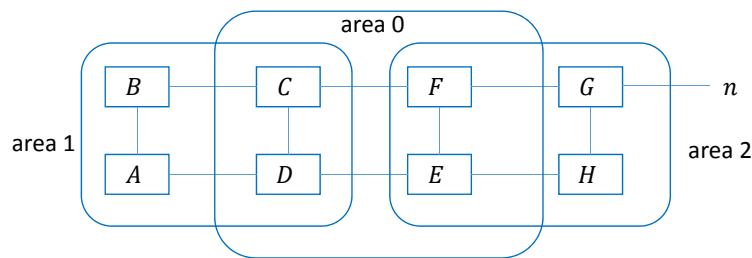
[A] A runs Dijkstra's shortest path algorithm to compute $d(C,n)$ and $d(D,n)$, then A reads $d(A,C)$ and $d(A,D)$ in its link state database, and finally A applies the formula $d(A,n) = \min\{d(A,D) + d(D,n), d(A,C) + d(C,n)\}$.

[B] A runs Dijkstra's shortest path algorithm to compute $d(A,C)$ and $d(A,D)$, then A reads $d(C,n)$ and $d(D,n)$ in its link state database, and finally A applies the formula $d(A,n) = \min\{d(A,D) + d(D,n), d(A,C) + d(C,n)\}$.

[C] By running Dijkstra's shortest path algorithm.

[D] A does not compute its distance to n, it simply reads it from its link state database.

Question 7   Say which is true about "Loose Source Routing":

[A] When a router forwards a packet, its decision is based on the source and destination IP addresses as well as the source and destination port numbers.

[B] The source writes in the packet header a sequence of some intermediate nodes that the packet must visit on its way to the final destination.

[C] When a router forwards a packet, its decision is based on both the source and destination IP addresses.

[D] The source writes in the packet header the complete sequence of all intermediate hops from source to destination.

Question 8   An OSPF domain has three non backbone areas (areas 1, 2 and 3) and one backbone area (area 0). Router $R1$ is in area 1 and not in area 0. How many Link State Databases does router $R1$ have ?

A 3.   B 2.   C 1.   D 4.

Question 9   Say what is true: With OSPF in a single area, a router $R1$ runs Disjktra's algorithm in order to obtain...

1. For every destination m, the next hop from $R1$ to m (or multiple next hops if there are several equal cost shortest paths).

2. The distances from all routers in the area to all destinations.

A 1 and not 2.   B None   C 2 and not 1.   D Both.

Question 10   In the following graph the edge costs are the same in both directions. We run Dijkstra's algorithm at node A. At step 1, the algorithm adds node A to the set V of nodes visited so far. Which nodes are added to V at steps 2 and 3 ?

A E then D.   B B then E.   C B then C.   D E then B.