Informal Quiz 3

True or False?

T  F

- Forwarding works in the control plane whereas routing works in the data plane
- A routing protocol summarizes global information to setup a local next-hop entry in the forwarding table
- Telephony uses simple alternate path routing partly because the core is fully connected and components are extremely reliable
- The Bellman-Ford algorithm/distance-vector protocol involves checking neighbors’ distance vectors and updating its own distance vector.
- The link state method does not face the count-to-infinity problem because it has complete global information (a map in terms of link-states).
- Both the distance-vector and link-state approaches could lead to transient routing loops because the information maintained could be incomplete.
- Hierarchical addressing, and proper address assignment allows entire subnets to be viewed by interior routers as “virtual nodes”, leading to routing scalability

The throughput of a M/M/1 queue is simply $\rho = \frac{\lambda}{\mu}$

- It is the determinism in the M/M/1 queuing model which leads to queues and waiting times.
- A Bernoulli distribution can be studied by considering a sequence of N binomial trials, and counts the number of successes in N trials.
- In the experiment of tossing a die, the set $X = \{0,1,2\}$ which denotes the possibility of the outcomes being 0, 1 or 2 is a random variable.
- A random variable (R.v.) models a measurement, whereas probability models an experiment, and r.v. is used when the measurement does not necessarily captures the set of all possible outcomes of the experiment.
- The Poisson distribution is a continuous-time approximation of the binomial distribution, derived by assuming $np = \lambda$, and $n$ is very large.
- The M/M/1 system is stable when the number of times the system leaves a given state is equal to the number of times the system enters it.
- Splitting a M/M/1 system into k servers (of equal capacity $\mu/k$) and equal average load ($\lambda/k$) results in the avg. waiting time to drop by a factor of k
- $P(X > k + t/X > t) = P(X > k)$ is the way of formulating the memoryless property.
Slotted ALOHA has improved utilization since the window of vulnerability is halved compared to pure ALOHA.

CSMA/CD is likely to be much better than CSMA when \( t_{\text{prop}}/t_{\text{trans}} > 1 \)

The logical bus model used in Ethernet implies that the channel is used in a half-duplex mode, which is why hubs do not appear in Gigabit ethernet.

Hubs connect two collision domains, whereas bridges connect two broadcast domains.

Bridges and switches in Ethernet allow separation of collision domains, and reduce the degree of sharing of the physical media.

100Base-T was made possible because the maximum segment length necessary in UTP tree architectures was 100m.

The smallest valid Type field in the Ethernet header is 0x0800 because of interoperability concerns with IEEE 802.3 which has a MTU of 1518 bytes.

The reason Ethernet has a minimum frame size is to guarantee detection of collision (or the lack of it) before the end of frame transmission.

The reason a collection of bridged collision domains do not scale is because the probability of broadcasts (by nodes or bridges) increases.

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Informal Quiz 3 (solns)

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1. Forwarding works in the control plane whereas routing works in the data plane.
   - True

2. A routing protocol summarizes global information to setup a local next-hop entry in the forwarding table.
   - True

3. Telephony uses simple alternate path routing partly because the core is fully connected and components are extremely reliable.
   - True

4. The Bellman-Ford algorithm/distance-vector protocol involves checking neighbors’ distance vectors and updating its own distance vector.
   - True

5. The link state method does not face the count-to-infinity problem because it has complete global information (a map in terms of link-states).
   - True

6. Both the distance-vector and link-state approaches could lead to transient routing loops because the information maintained could be incomplete.
   - True

7. Hierarchical addressing, and proper address assignment allows entire subnets to be viewed by interior routers as “virtual nodes”, leading to routing scalability.
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