Informal Quiz #07: Routing II

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Routing II: Informal Quiz
Routing II: Protocols

- A hop count of 16 in RIP indicates a distance of infinity.
- RIP uses a 16-bit weight field to indicate the weight of each link.
- RIP assumes that a neighboring node and its attached link to it are not functioning if it does not receive an update from them in 180 s.
- When RIP figures that a neighboring node and its attached link to it are not functioning, it sends out an immediate triggered update to its neighbors.
- In the poisoned reverse scheme, all nodes advertise distances of infinity to all other nodes.
- The poisoned reverse scheme solves all convergence issues in RIP.
- RIP has convergence problems because of issues like count-to-infinity, whereas the complexity in OSPF is in distributing the link states efficiently.
- A distance vector approach has a complete network map at every node.
- Diffusing computations (e.g., DUAL) works because inconsistent information is not accepted while the routing tables are “frozen”.
- OSPFv2 uses the lollipop sequence number space to prevent wrap-around.
- A low value of the age field and a high value of the sequence number field indicates a stable routing entry.
- On a point-to-point link, OSPFv2 performs database synchronization by exchanging its entire database between neighbors.
Routing II: Protocols

- An OSPF neighbor is assumed to be dead (i.e. the link is down) if no reply to the Hello message is received within the “HelloInterval” period.
- OSPF routing adjacencies are more reliable and stable compared to physical links.
- The database synchronization operation in OSPF is done upon discovering a new neighbor.
- It is generally easier to map IP to L2 protocols than to map routing protocols (like OSPF) to L2 protocols.
- On a broadcast LAN subnet, OSPFv2 prescribes the use of Router-LSA.
- A broadcast LAN subnet is viewed by the Dijkstra algorithm as a full mesh of links.
- On a broadcast LAN subnet, the DR is the router that generates the Network-LSA.
- Hellos and LSAs are multicast in broadcast LANs.
- LSA-acks are sent only to the DR and BDR, but Hello-Acks are piggybacked onto Hello multicasts on broadcast LAN subnets.
Routing II: Protocols

- A routing adjacency is equivalent to a separate physical link
- The neighbor relationship is a unidirectional relationship
- Hellos are sent periodically, whereas LSAs are sent only when a link state changes.
- A network-LSA is generated by any random router on the broadcast LAN subnet.
- An NBMA subnet allows cheap broadcast capability.
- The NBMA model requires a (costly) VC between any pair of routers on the subnet.
- Address abstraction is equivalent to topology abstraction in a hierarchical network like IP.
- OSPF supports arbitrary number of levels in its hierarchy
- An area ID can be encoded into an IP address, and hence areas can be auto-configured.
- AS-BRs operate at borders of areas and send summary information in and out of an area.
- ABRs generate external LSAs, which is summary information from other areas in the same routing domain.
- The metric field in a summary-LSA advertised by an ABR is the cost of the longest path from the ABR to any node within the area.
- The difference between an “area” and a “domain” is that different routing protocols operate beyond the boundaries of domains.

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Filtering of external-LSAs is a big concern because external BGP routes may number more than 100,000!

IS-IS operates over IP whereas OSPF operates over the link layer directly.

IS-IS provides highly extensible TLV encoding, but OSPF focuses on optimization and alignment of fields.

PNNI is a source-routed protocol and supports the QoS signaling in ATM.

The entire route in PNNI is encoded as a DTL and is processed at every hop.

In general, signaled protocols can afford to be wasteful in terms of encoding and complexity during the signaling phase and efficient in the packet-transfer phase.

PNNI is limited to only 2 levels of hierarchy.

QoS routing is different from traffic engineering because it incorporates network utility objectives as well as user utility (QoS) objectives.

Traffic engineering can be flexible if the problem of finding and establishing routes can be decoupled from the problem of mapping traffic to established routes.

Traffic engineering in connectionless protocols is typically achieved indirectly, i.e. by manipulating the parameters (e.g., link metrics) in a traffic-aware manner.

Adaptive routing can lead to instabilities if done at very short time-scales, with mechanisms that can operate only on longer time-scales.

MPLS offers a connectionless method for traffic engineering.

Signaling mechanisms for QoS routing or traffic engineering can be integrated with link-state routing architecture.