

ECSE-6600: Internet Protocols

Informal Quiz #05

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Routing II (Slide set #6): 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 (eg: 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.

Routing II: Protocols

- □ 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 (eg: 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.