ECSE-6600: Internet Protocols

Informal Quiz #06

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Routing III (Slide set #7): Informal Quiz

Routing III: BGP

- ☐ All routers in the Internet participate in both intra-domain and inter-domain routing protocols.
- ☐ Inter-domain routing processes AS-level route information, but its goal is ultimately to enter to next-hop values to destination prefixes in forwarding tables
- ☐ The core (inter-domain) routers in the internet may have default route entries in their forwarding table.
- ☐ Core routers must have explicit forwarding table entries for any part of the public IP address space
- ☐ The Internet has only one global "core" network administered by a single entity.
- ☐ Like RIP, EGP and BGP send out full routing tables to their neighbors periodically
- ☐ BGP finds inter-AS routes, and then resolves it to find the physical next-hop.
- ☐ All default-free routers on the Internet speak BGP
- ☐ Path-vector based distance vector algorithms have a full map of the network like Link state algorithms
- ☐ The Bellman-Ford algorithm is used in policy-based distance-vector routing for BGP.
- ☐ Link-state based policy routing is less preferred to vectoring protocols (like BGP) because local policies need to be announced globally, and convergence of the flooding protocol is problematic in link-state.

Routing III: BGP

- ☐ The goal of EGP is to provide the shortest path from the source AS to the destination AS
- ☐ EGP is restricted to a tree topology because it is incapable of comparing path lengths.
- ☐ Currently core routers have about 100000 routes, which suggests poor address aggregation
- ☐ EGP declares that a neighbor is down when a single Hello message is unacknowledged.
- ☐ Any route between two nodes in an AS cannot touch nodes outside the AS
- ☐ The AS number is the same as the area ID and sub-network address.
- ☐ Today's inter-AS topology is complex, but it still has a roughly hierarchical structure embedded in its complexity
- ☐ An AS number can be encoded into an IP address just like a network ID
- ☐ BGP uses a fixed tree structure to propagate reachability information from AS to the core.
- ☐ Like the telephony protocols, BGP requires explicit signaling to setup an AS-PATH when IP connections arrive

Routing III: BGP

- ☐ Policy routing refers to an arbitrary preference (not just shortest path) from a menu of available routes
- ☐ A stub AS could carry traffic that neither originates nor terminates at the AS.
- ☐ Peer ASes provide transit services to other peers.
- ☐ An AS can be internally disconnected, and use an inter-AS route to reach a destination within the AS
- ☐ A public ASN assignment to an AS means that it can formulate its own routing policy
- ☐ A transit-AS differs from a peer-AS primarily in the fact that one party necessarily pays in a transit relationship
- ☐ Just like OSPF, IS-IS and RIP, we have multiple widely deployed exterior gateway protocols on the Internet today.
- ☐ Like OSPF, BGP operates directly over IP without an intervening transport protocol.
- ☐ Like RIP, BGP sends periodic updates about all routes to its neighbors
- ☐ Policy routing is based upon the various attributes of routes: ultimately one route is selected to any destination prefix.
- ☐ A BGP router should announce a route to a destination prefix only when it is actively using that route to reach the destination prefix.
- ☐ iBGP and eBGP are the same protocol, and the same as any IGP protocol.

Routing III: BGP

- iBGP is a BGP route synchronization protocol using within an AS.
- AS confederations and route reflectors are two ways of addressing the same problem: the scaling problems due to the iBGP full mesh requirement.
- The route-reflector concept converts a full-mesh of iBGP sessions to a tree-structure of iBGP sessions.
- CIDR solves the router-table size explosion problem by allocating only contiguous blocks of addresses which are summarizable.
- The CIDR part of BGP-4 allows address aggregation
- Deaggregation or punching of holes in an address prefix essentially subverts the CIDR address aggregation process and may lead to larger routing tables in the Internet
- Subverting the CIDR aggregation by punching a hole and advertising it to a different ISP may lead to some inbound load-balancing benefit, at the expense of the entire Internet
- CIDR introduces the need for longest-prefix-match forwarding instead of a simple prefix match forwarding.
- BGP controls inbound and outbound routes by filtering them based upon the attributes.
- An ORIGIN attribute of “INCOMPLETE” indicates that the routes were injected dynamically into BGP by IGPs.

Routing III: BGP

- ☐ The routes in Adj-RIB-Out are likely to be different from Adj-RIB-In because BGP does policy-based route filtering
- ☐ The Loc-RIB is used to announce routes within an AS (I.e. using IBGP).
- ☐ One of the steps of the BGP “tie-breaker” algorithm prefers the lowest ORIGIN attribute because statically injected routes are likely to be more stable than dynamically injected routes.
- ☐ The AS path length attribute cannot be used by IBGP for loop-detection because the IBGP operates within a single AS
- ☐ Default routing works because there exists a set of “core” routers which do not use default routing.
- ☐ The MED and LOCAL_PREF attributes in BGP can be used for load-balancing.
- ☐ Recursive lookup in BGP guarantees loop-free paths
- ☐ Policy routing essentially allows an arbitrary choice between available set of paths
- ☐ MED allows outbound load-balancing
- ☐ LOCAL-PREF allows inbound load-balancing

Routing III: BGP

- ☐ AS-path Padding is used as a rough way to control inbound load, but it may not work, if the AS is providing the only path to the destination prefix
- ☐ Hot-potato routing refers to carrying traffic in the same AS as far as possible before letting it cross AS boundaries.
- ☐ Multi-homed ASes have exactly one outbound link to the external Internet.
- ☐ An AS may be multi-homed to a single transit provider, and MED is useful in this situation
- ☐ Since the MED field is sometimes the IGP routing metric, it could lead to route-flapping and a lot of eBGP update traffic.
- ☐ A community attribute allows arbitrary coloring and processing of routes. But the community values (colors) have to be agreed upon by the set of ASes involved.
- ☐ The first 16 bits of the community attribute is just the AS number.
- ☐ The BGP decision process is a simple tie-breaker set of rules, with the recursive lookup and local-pref rules being the highest priority
- ☐ A stateful route flap dampening algorithm has been used to dramatically reduce the average number of updates sent by BGP
- ☐ BGP often takes a long time to converge after route changes.