TCOM 610-BGP Class Project

OBJECTIVES

This is an exercise to help you to get familiar with BGP routing policies. Using knowledge from the class, you will design BGP policies with focus on the Internet connectivity and its traffic flow.

A hosting company XYZ with AS123 has 2 data centers located on the east coast of the USA. A backbone connection is needed to provide secure connectivity for management traffic and backup path between data centers. Internet connectivity is considered mission-critical to provide services to its customers. Multiple providers and connections at each location are used to provide fault-tolerant services in case a fault happens in a provider network. Attached diagram is physical connections of its network.

NETWORK OVERVIEW

The backbone has 2 POPs (Point of Presence) at New York and Washington DC area. Each POP has a connection to P-ISP – Premium ISP (AS100) and C-ISP – Cheap-ISP (AS800) for redundancy. All circuits in this network are OC3 (155mb/s) except the dotted line between US and Europe, which is DS3 (45mb/s) at this point.

The company owns the 100.0.0/14 of public address space. Each POP location is allocated a /16 out of the /14 public space. The enterprise is assigned an Autonomous System Number (ASN) 123.

OSPF routing protocol is the IGP in this network to carry the reachability for loopback and connected subnets. All routers are running BGP protocol with AS123 and iBGP fullmesh.

QUESTIONS

For each of the following questions, provide your design solution (either graphically or verbally) and provide Cisco or Juniper sample implementation. If your implementation requires more details than specified in this project, you can simply specify your assumption and proceed with your project.

(1) Design a BGP routing policy toward P-ISP and C-ISP for the network in the US to satisfy the following requirements:

- All traffic (in/out) will be through C-ISP
- P-ISP circuits should be idle and strictly for backup failure protection
- You have to answer what route to receive from two providers and routing policies applied to the received routes, how to originate/announce your routes to both ISPs

(2) Design a BGP policy to accommodate the following changes from requirements in (1)

- Use P-ISP connections for its direct customers only and backup Internet connectivity under C-ISP failure
- Use C-ISP connections for all other Internet traffic
- Have providers deliver traffic to xyz in its closest points to the destination (Inbound cold-potato routing)

- Hand over traffic to providers at earliest exit points (Outbound hot-potato routing)
- Provide necessary route announcement so that inbound traffic from P-ISP is not overwhelmed, since P-ISP is much better connected than C-ISP

(3) Based on scenarios (2), if C-ISP circuit in NY gets hot in both IN/OUT directions, design a temporary policy to balance traffic with C-ISP's circuit in DC area.

(4) The company expands its network to Europe with a POP in London. It only has one local internet providers, EU ISP with AS1800. Design a BGP policy to support the following:

- In steady state, traffic in and out of Europe POP should only use E-ISP
- Traffic to and from the US should never transit Europe POP. In other words, E-ISP cannot backup US traffic
- If E-ISP fails, US Providers should be used for EU traffic's access to Internet

(5) (Bonus: 5 points) Implement the policy in (3) and (4) in Cisco IOS or Juniper JUNOS Syntax.

Notes and Hints:

1. Use provider communities wherever necessary – use the following links for references, and you can assume all ISPs implement similar community-based BGP policy

- <u>http://www.sprintlink.net/policy/bgp.html</u>
- http://www.verizonbusiness.com/uk/customer/bgp/

2. IBGP policies may be needed to achieve certain results, especially for (4)

3. Always consider traffic in both directions and route announcement in both directions

4. Provide high-level design solutions first and pseudo-policy, and then implement in pseudo Cisco IOS syntax.

