CS6250/4251

Fall2021 Quiz 1

Important Instructions:

- ***Open Book and Notes***
- ***Time: Test available at 9:25am on Canvas. Uploads must complete by 10:30am. Late uploads accepted until 10:45am with 20% penalty. Canvas will not accept uploads after 10:45am. (All times Atlanta Time).***
- ***Please answer questions on your own paper, or tablet. Scan or convert to PDF and upload. Typed answers and converted to PDF are also OK.***
- ***You may not consult with other "humans" (students, friends, family, …). Violations of this rule will have serious consequences.***
- ***Ask questions during the test through 6250/4251 Piazza.***

Question 1 (50 Points)

The following questions all refer to the AS Graph on the next page.

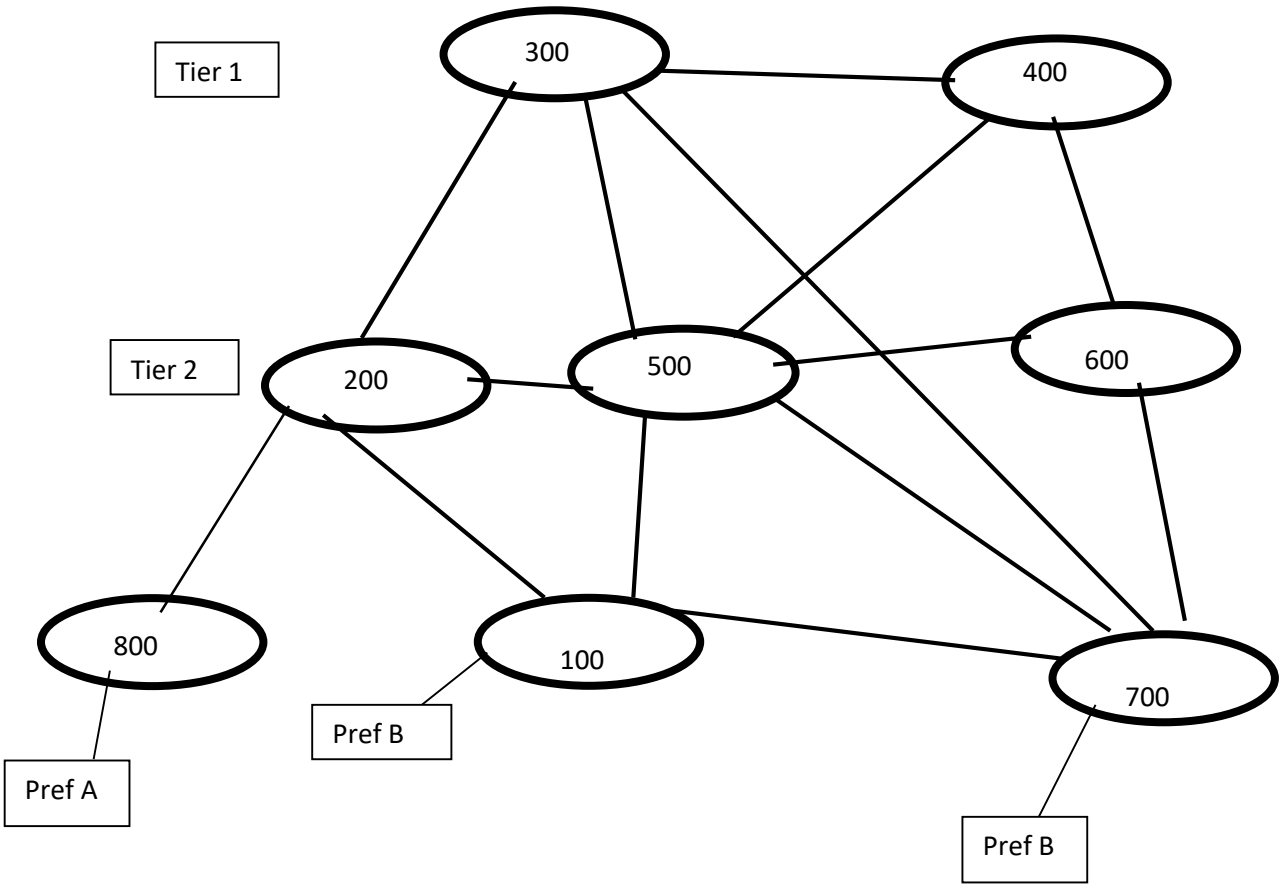
a) What is the type of link connecting stub ASes 100 and 700? (A one word answer is sufficient here.)

b) Show *two* non-looping AS paths that start and end at a stub AS, *one legal and one illegal*, each containing exactly two Tier 1 AS numbers.

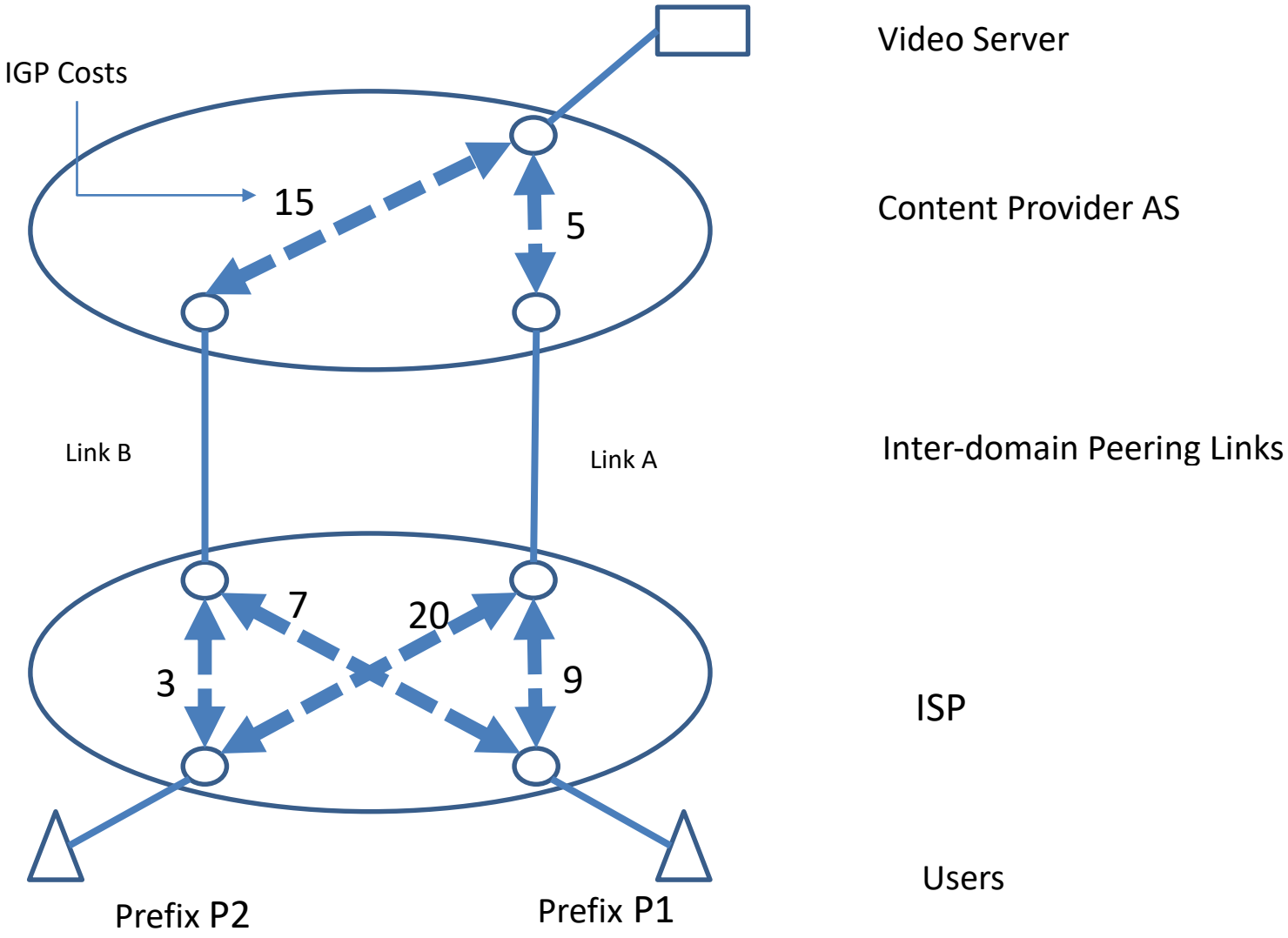
c) In the AS graph below, network operators observe that the following illegal AS path is being used to reach Prefix A from AS 700: (800, 200, 100, 700). i) Which two ASes should be alerted to fix their configurations to avoid this illegal path? ii) Which part of these AS border routers functions need to be reconfigured to fix this?

d) Is the AS Path 800, 200, 500, 600, 700 legal? If not legal explain why?

e) Suppose in the AS graph below Prefix B is duplicated (intentionally or by mistake) in two ASes. An end system in Prefix A sends data to an end system in Prefix B. Assuming no AS path Prepending, which AS will this data reach and why?


Tier 1
300
400
Tier 2
200
500
600
800
100
700
Pref A
Pref B
Pref B

Question 2 (50 Points)



Consider the inter-AS scenario using BGP depicted above. Answer the following questions:

a) Assume no Local Preference and no AS path prepending are used. Show the paths that will be used from video server to the users and vice-versa for both prefixes P1 and P2. We are looking for 4 paths in total. You can indicate the path by

[source end system, Interdomain link, destination end system]

For example, [Prefix P1, Link B, Server] is a path from Prefix P1, through Link B to the server.

b) In part a) above, what is the BGP selection criteria that selects which paths are being used?

c) Now assume that the ISP would like to ensure that all video data ***from*** the content provider is carried over the paths with low IGP cost within the ISP network. How can the ISP do this? Make sure you separately answer this question for video going to Prefix P1 and Prefix P2.

d) Independent of what the ISP AS wants, the Content Provider AS would like all video data going to the ISP to traverse inter-domain link A. How can the content provider achieve this?

e) Show one contradiction between what the Content provider wants in part d) and what the ISP wants in part c). In this case which of the two will get their way? Explain why.