III Network Neutrality

13. [4 points]: Define *network neutrality*. Suppose that network neutrality is *not* enforced. Describe one benefit to users, one benefit to ISPs, and one benefit to content providers.

(Answer legibly in the space below.)

Net neutrality: ISP cannot discriminate against one type of traffic or another (nor charge more for certain types of traffic.)

(many answers possible)

Users: pay only for what you use

ISPs: ~~[illegible]~~ more profit!

Content providers: could pay more to get better service.

14. [4 points]: Explain why the lack of network neutrality might give an unfair advantage to an ISP like Comcast, who also owns NBC, a major provider of content such as television shows.

(Answer legibly in the space below.)

Comcast could, for example, give priority to video streams of NBC content, or charge more for streaming non-NBC content.

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15. [8 points]: A recent court ruling against the FCC suggested that although ISPs did not need to remain neutral, they needed to be *transparent*, meaning that they would have to be clear about their traffic prioritization and differential pricing policies.

A. George Burdell wants to design a system to enforce transparency for ISPs in Atlanta. He starts off by using a tool like `iperf` (which you used in the assignments) to measure TCP throughput from his laptop at home to a server running in San Francisco. He notices that the output of `iperf` does not match the downstream throughput rate that his ISP advertises. Ben Bitdiddle suggests that he should instead try using `iperf` to a server that is located in Atlanta and he might see `iperf` achieve a higher rate. Is Ben right? Why or why not?

B. *Open-ended.* George begins sending traffic to the server in Atlanta and notices that `iperf` *still* doesn't yield a throughput that is close to what his ISP advertises. Ben suggests that other factors, such as George's laptop wireless card, the amount of load on his machine, "cross traffic" from other devices in his home, etc. may be interfering with George's measurement. Help George make changes to his method that would better help isolate these effects. *Hint:* You can consider collecting additional data, changing the vantage points that George is measuring to or from, and so forth.

(Answer legibly in the space below.)

A. He is right. Several possible reasons:

- TCP throughput is inversely proportional to RTT.
- wide-area path might traverse congested peering links.

B. ① Collect performance data directly from the router.
② collect performance data from many homes subscribed to the same ISP. Compute means, medians, etc.
(other correct answers exist)

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