Handout #2 — CS 471

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1 Questions

Note: The Quizlet for this class can be found <u>here</u> and can be referenced instead of this and subsequent documents.

1. How does the digital subscriber line (DSL) allow telephony and Internet to co-exist on the same link?

   - Telephony and Internet are transmitted on different frequencies thanks to the DSL modem to the DSL access multiplexer. Those different frequencies are parsed and sent to their respective destinations.
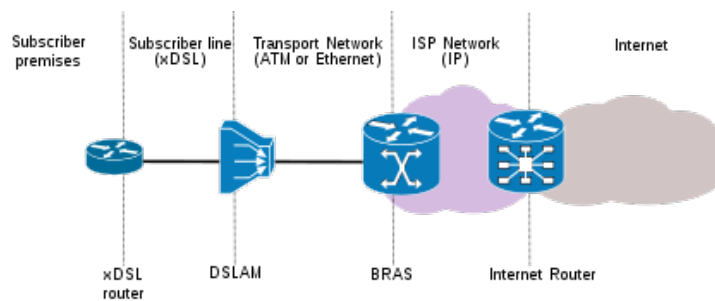

Figure 1: DSLAM Diagram

2. What is the function of the DSL access multiplexer?

   - Connects multiple customer digital subscriber line interfaces to a high-speed digital communications channel using multiplexing techniques

3. What is the main limitation to DSL?

   - Proximity to the DSL provider. Farther away means a weaker connection.

4. Briefly explain the structure and function of the hybrid fiber coax (HFC) approach to connecting residences to the Internet. How does it differ from DSL? What are the advantages? Are there security concerns?

   - HFC: combines optical fiber and coaxial cable. Optical uses light and coaxial employs electricity.
   - A network of cables and fiber attaches homes to the ISP router, rather than having a direct communication the central office (DSL protocol). Here, homes share access network to the cable head end.
   - Advantages: faster; 40 up and 30 down

5. What is the difference between guided and unguided media?

   - Guided: Signal propagates in a sold media, such as wire or fiber.
   - Unguided: Signal propagates freely, such as radio waves.

6. Host A and host B are connected by two intervening routers. All intervening links have speed of 10 bps. Suppose A wants to send a 10,000 bit packet to B. How log will it take with and without store-forward approaches?

   - Without (unrealistic): $\frac{10000}{10} \implies 1000$ seconds.
   - With (realistic): there are three different endpoints that must be satiated. Therefore the total time is $3 \times 1000 = 3000$ seconds.

7. Why is the store-and-forward approach necessary?

   - It ensures that the data sent by the initiator will eventually reach it's destination.

8. When can packets experience queueing delays or be lost entirely?

   - If packets are sent faster than they can be processed (delay)
   - Packet queue is full when received (completely lost)

9. Assume that 25 users are fairly sharing a 100 bps link. How long will it take one user to transmit a 20,000 bit file?:

   - Each user has a designated 4 BPS to themselves and using that we can calculate the time taken: $\frac{20,000 \text{ bits}}{4 \text{ bits per second}} \implies 5,000$ seconds

10. Assuming a 1,000,000 BPS link and users who transmit at a rate of 56,000 BPS each, how many users can we support using circuit switching? Packet switching?

    - Packet switching: $\frac{1,000,000}{56,000} \sim 17$ users
    - Circuit switching: 1 user (direct connection, needs more resources)