Assignment 1

Due Tuesday, February 23. Show your work. Hand in your assignment using the appropriate dropbox on the course web site. Assignments submitted after the solutions are made available will be given a mark of zero.

Question 1

When were each of the four access technologies to be discussed in this course first commercially deployed? Provide a reliable reference for each (a URL is fine).

Who is the main service provider for each of these technologies in Vancouver?

Question 2

Shown below is a flow chart below for an automated dialer that calls phones and plays advertising. Which of the actions and conditions shown in the flowchart correspond to each of the following:

1. 620 Hz tone detected

2. no 480 Hz tone detected for at least 4 seconds

3. dial the number

4. go off-hook

5. 350 Hz tone detected

6. go on-hook

7. play the ad

Explain the purpose of each action or the cause of each condition.
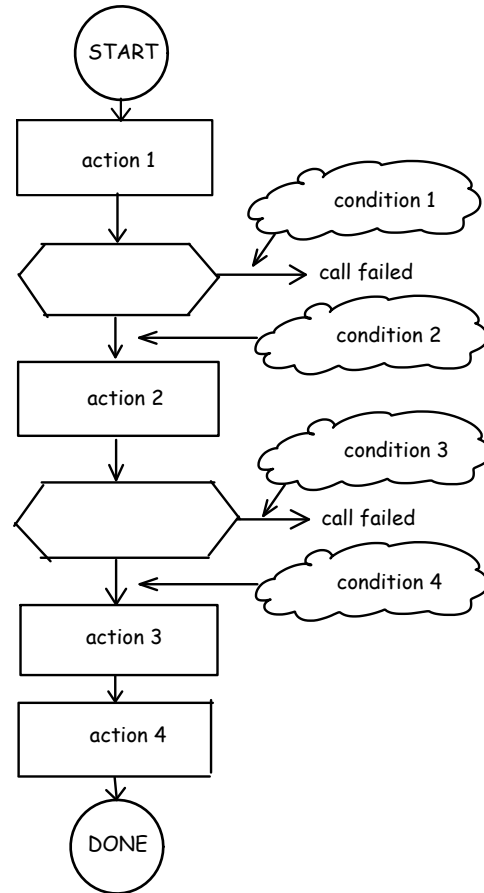
Question 3

Assume a CO has a 48 V battery voltage and 200 ohm current-limiting resistors on each of tip and ring. What voltages (relative to ground) would the CO see on tip and ring when a customer seizes the line using (a) loop-start, and (b) ground-start. Assume the loop and telephone resistances are negligible.

Question 4

You need to install a pad (attenuator) on a CM to bring the signal level to 0 dBmV. You measure the signal level as -36 dBm. What attenuation (in dB) is

required? Assume 75 ohm impedances. Show your calculations.

Question 5

A CB radio transmits at a frequency of 27 MHz. If this signal leaked into a subscribers's cable (e.g. due to faulty wiring) would the signal be detectable at the CMTS? Who would this signal interfere with?

What if the signal were from a baby monitor transmitting at 100 MHz?

Question 6

Based on the Arris MB100 Datasheet (E-GaAs model), answer the following questions:

(a) what are the downstream and upstream frequency ranges?

(b) what are the the maximum forward (DS) and reverse (US) gains?

(c) What is the maximum thermal noise output power contributed by this amplifier on the downstream assuming maximum gain and a 6 MHz bandwidth?

(d) do the downstream group delay specifications meet the DOCSIS 1.0 channel assumptions?

(e) How many of these amplifiers can be placed in series without exceeding the maximum bypass current assuming a 60 VAC supply?

Question 7

Measurements of noise on a cable distribution system indicate that errors happen in burst with a duration of 10 μs or less. Assuming a DS data rate of 36 Mb/s, a maximum interleaver size of 1024-bytes and $t = 1$, how many rows and columns should the interleaver use and what values of n and k will ensure these error burst can be corrected while maintaining the highest possible code rate?