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CSE 34468
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Homework 4

1. Suppose that we have a data frame consisting of 0000 0111 and want to have an even parity, what should the parity bit be?

TO have an even parity the data frame will be a 1, this will make is so the number of total 1's is 4 and even.

2. From your apartment, use either your phone or your laptop and determine how many different access points that you can see. List all of the WiFi access points that are visible.

From my apartment there are 23 total access points. Hotsplots_OTA_Berlin, FRITZ!Box 7530 XX, OTA-Planet, TV-intern, DIRECT-BA-HP ENVY 4520 series, inemetz08, lazydogg, Pberschnecke, Schnuckelputz, WLAN-289877, HP-Print-77-Officejet Pro 8600, MagentaWLAN-GQAK, PrettyFly4aWifi, PYUR 9A84F, Schnuckelputz5g, Sonne, Vodafone-0A54, wifi, wifiiiii, ECOVACS_1157, Vodafone Homespot, Vodafone Hotspot, Hidden Network

3. In your apartment, determine the various settings as received by DHCP. Report the following:

IP Address: 192.168.47.219
Subnet/Subnet Mask: 255.255.252.0
Gateway/Router: 192.168.44.1
DNS Server: 192.168.44.1

4. Write a Python function named calculateSpeed that is called every 100 milliseconds that receives as a parameter the last count of field detections, and the current count of field detections in order determine the current speed of the car.

```python
import math

def calculateSpeed(current, old):
    radius = 9.5
    circumference = math.pi*radius*2
    counts = current-old
    distance_travelled = counts*circumference/2 # Distance in inches
    speed = distance_travelled/0.1 # Speed in inches per second
    speed = speed*3600/(5280*12) # Speed in MPH
    return speed
```

5. Describe the key differences between a rotary potentiometer and a digital encoder.

A rotary potentiometer is a variable resistor that produces an analog output proportional to the rotation angle. A digital encoder is an absolute or incremental sensor that generates a digital signal corresponding to rotational motion. A digital encoder is more accurate than a

potentiometer and will last longer as the connection between the metal in a potentiometer can wear down over time changing the voltage.

6. In the context of wireless, what does URLLC mean and why does it matter? Would URLLC matter in the context of the smart sewer system discussed on Monday in class?

URLLC means ultra-reliant low latency connection. URLLC allows a latency of less than 1ms and allows real time communication between devices. In the context of the sewer system discussed in class, URLLC could be used so communication between the sensors in the sewer can communicate with the main computer quickly. This would be especially useful in flash floods and large rain events to sense an influx of extra water and close the gate to keep the dirty sewer water from flowing out of the pipes in an unsafe amount. The sensor would need to instantly send this information in order to stop as much excess water and sewage from leaking into the river as possible.

7. What were the two companies that created SPI and I2C? When were each of the technologies created?

The company that created SPI was Motorola in the 1980s, with some sources believing it came out in 1979 but first showing up in manuals during 1983. The company that created I2C was Philips Semiconductor in 1982.