a.) 3e8/1.055e8 = 3/1.055 = 2.8436019

2.8436019/4 = .7109 m

3e8/2.4e9 = .125

.125/4 = .03125 m

3e8/6e10 = .005

.005/4 = .00125 m

2.) 10000/4pi(20000^2) = 0.000019894 watts/m^2

50 cm^2 = .005m^2

.005*0.000019894=.000000009947 watts

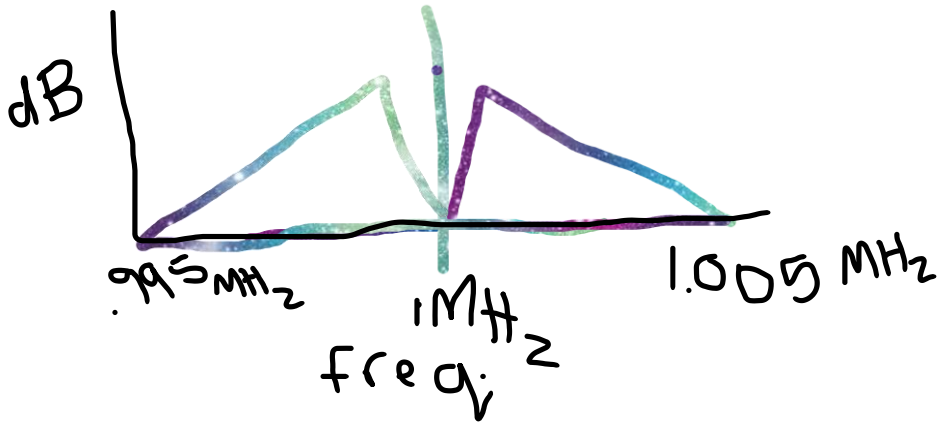
3.) 2.4 GHz = 10^(-.008/10) = .998 = .2% attenuation red graph is negligible

5 GHz = 10^(-.008-.002/10) .997 = .3% attenuation

60 GHz = 10^(-10-.1/10) = .097 = 80.3 % attenuation

b.) 60 GHz reduces the amount of signal that leaks outside of the building, long distance signal is undesirable

4.) .995 MHz to 1.005 MHz



5.) 400 Mb/sec SNR = 4.65

100Mb/sec SNR = 1

b.) x=100000log2(1+8) = 316992.5 bit/sec

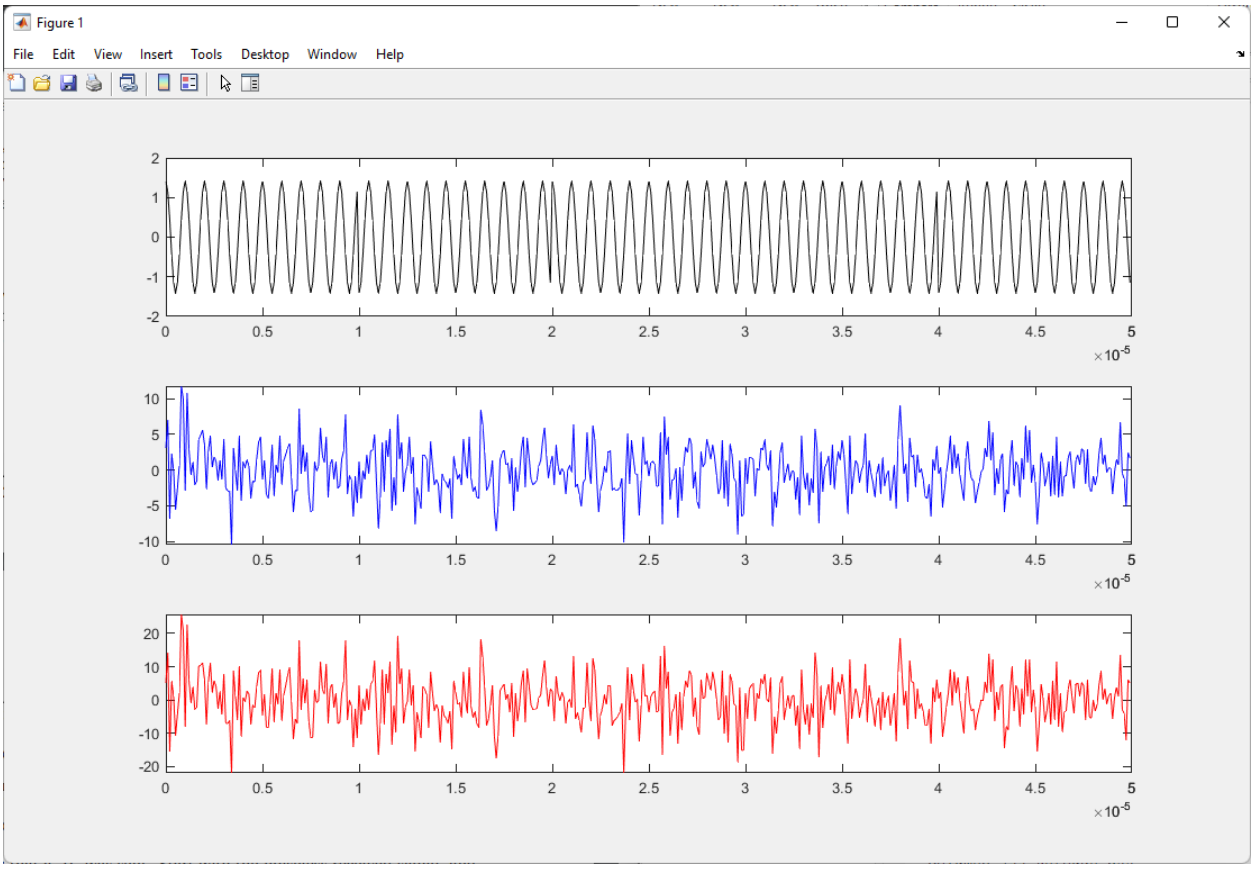


Figure 1
File Edit View Insert Tools Desktop Window Help
2
1
0
-1
-2
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5
×10-5
10
5
0
-5
-10
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5
×10-5
20
10
0
-10
-20
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5
×10-5

```
>> r=r0;
br=[];
for k=1:5
rk=r(100*(k-1)+1:100*k);
yk=sum(rk.*c);
brk=(yk>=0);
br=[br,brk];
end
br

br =

     1     0     1     1     0
```

no error

```
>> r=r1;
br=[];
for k=1:5
rk=r(100*(k-1)+1:100*k);
yk=sum(rk.*c);
brk=(yk>=0);
br=[br,brk];
end
br

br =

     1     0     1     1     0
```

no error

```
br=[];
for k=1:5
rk=r(100*(k-1)+1:100*k);
yk=sum(rk.*c);
brk=(yk>=0);
br=[br,brk];
end
br

br =

     1     0     1     1     0
```

no error

```
rk=xk+sqrt(50*P)*nk;
yk=sum(rk.*c);
brk=(yk>=0);
nerror=nerror+abs(brk-b(k));
end
>> ber=nerror/10000

ber =

     0

>> P=5;
nerror=0;
for k=1:10000
xk=(2*b(k)-1)*c;
nk=randn(size(xk));
rk=xk+sqrt(50*P)*nk;
yk=sum(rk.*c);
brk=(yk>=0);
nerror=nerror+abs(brk-b(k));
end
>> ber=nerror/10000

ber =

    0.2651

>> P=1;
nerror=0;
for k=1:10000
xk=(2*b(k)-1)*c;
nk=randn(size(xk));
rk=xk+sqrt(50*P)*nk;
yk=sum(rk.*c);
brk=(yk>=0);
nerror=nerror+abs(brk-b(k));
end
>> ber=nerror/10000

ber =

    0.0755
```