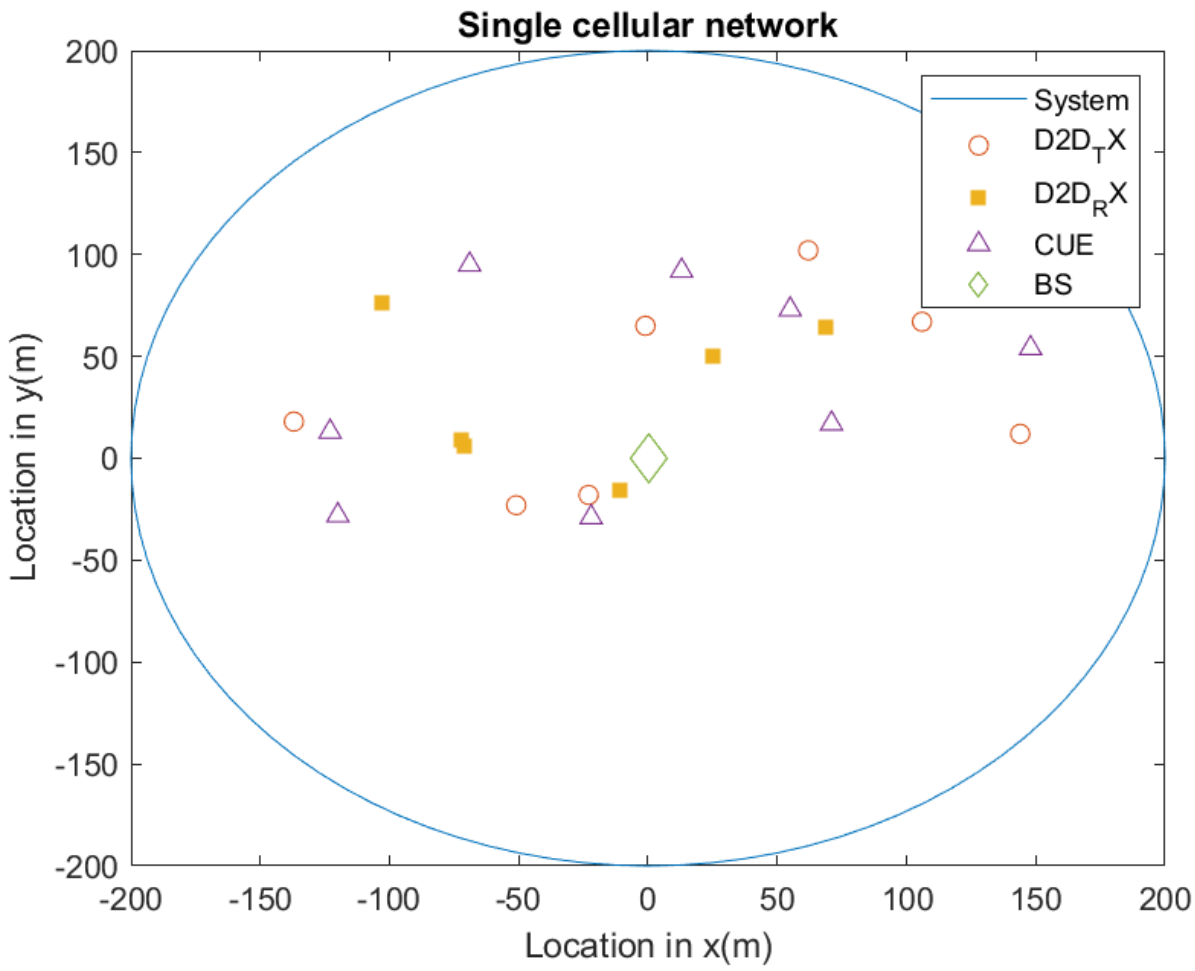
Date:2021-12-7

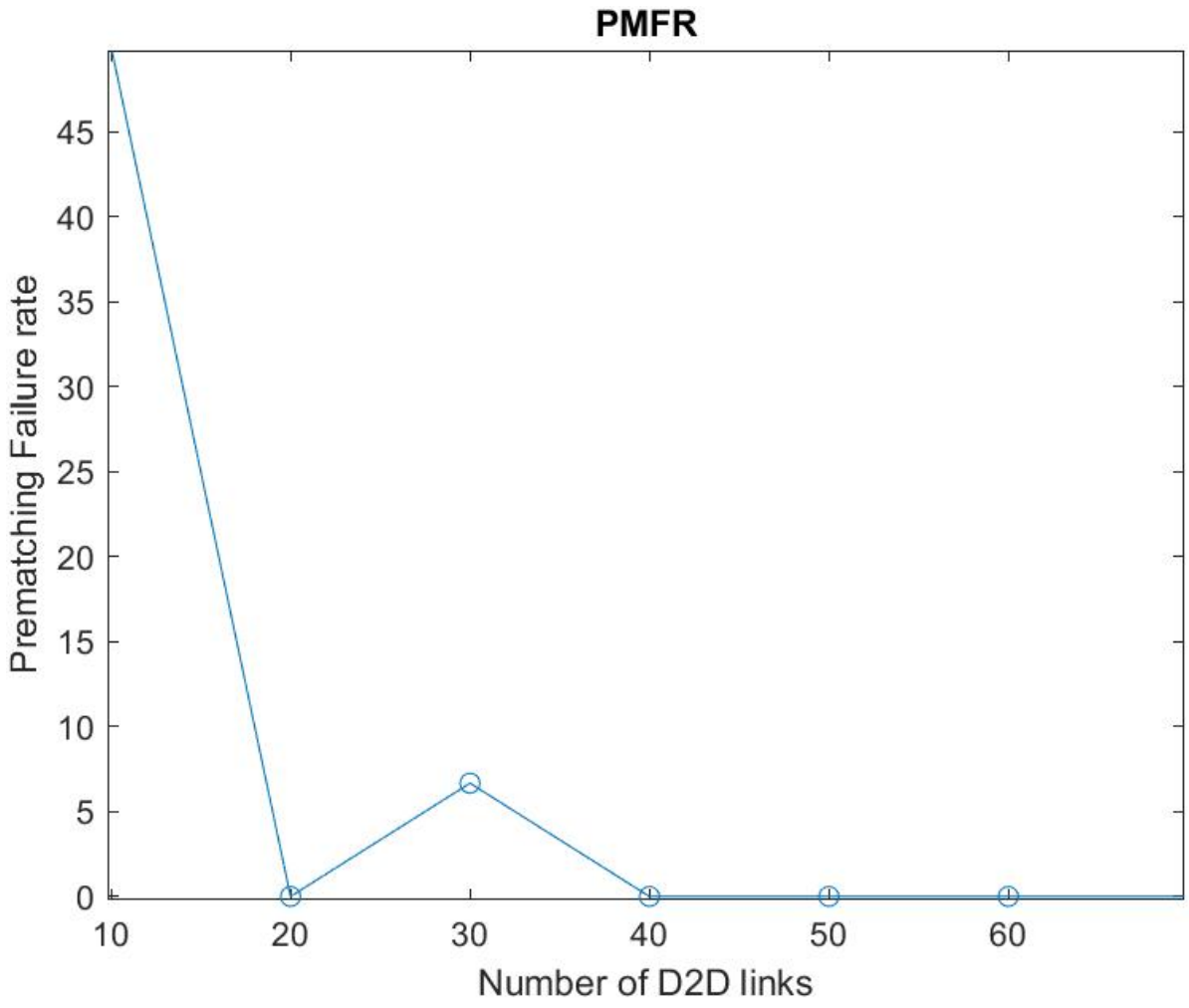
Finish a single cellular Network using MATLAB



System modeling

```
th = 0:pi/50:2*pi;
x=0;
y=0;
r=200;
xunit = r * cos(th) + x;
yunit = r * sin(th) + y;
number=randperm(300,30)-150;
number1=number(1:7)
number2=number(8:14)
number3=number(16:23);
Choice=randperm(150,120)-30;
D2D_TX=Choice(11:17);
CUE=Choice(41:48);
D2D_RX=Choice(81:87);
BS=0;
plot(xunit,yunit)
hold on
scatter(number1,D2D_TX);
hold on
scatter(number2,D2D_RX,'filled','s');
hold on
scatter(number3,CUE,'^');
hold on
scatter([0],BS,140,'d');
hold off
legend('System','D2D_TX','D2D_RX','CUE','BS');
title('Single cellular network')
xlabel('Location in x(m)')
ylabel('Location in y(m)')
```

First test for Prematching algorithm


PMFR
Prematching Failure rate
45
40
35
30
25
20
15
10
5
0
10
20
30
40
50
60
Number of D2D links

Test for Prematching Algorithm

```
% C=[1:30];
% D=[1:30];
Pkc=0.2;
pth1=10*10^(-6);
TminD=2;
N0=1e-13;
N1=1e-13;
Pmax=0.2
% path_loss_exponent=3;
% hD=h_rayleigh1*30^(-path_loss_exponent);
% hki=normrnd(0,1)*50^(-path_loss_exponent);
% lambda_min=(pth1)/(Pmax*hD+Pkc*hki+N0);
% Tmax=log2(1+(Pmax*hD)/(Pkc*hki+N0+(N1)/(1-lambda_min)));
Num=linspace(10,70,7);
PFMR=[]
for i=10:10:70
   D=[1:i];
   C=[1:i];
   [SiD,InfD,EhaD]=Prematch(D,C,Pkc,pth1,Pmax,TminD);
   b=size(InfD(InfD~=0),2);
   temp=(b/i)*100;
   PFMR(end+1)=temp;
end
plot(Num,PFMR,'-o')
xlabel('Number of D2D links');
ylabel('Prematching Failure rate');
title('PMFR');
% [SiD,InfD,EhaD]=Prematch(D,C,Pkc,pth1,Pmax,TminD);
% SiD
% a=size(EhaD(EhaD~=0),2)
% b=size(InfD(InfD~=0),2);
```

The PFMR is confusing, since it didn't quite go down when then number of D2D links goes up as expected. I think it is due to the fact that the distance parameter I chose from the CUE k and D2D link i is wrong, also, I think the generation of the rayleigh channel coefficient is a a bit weird, which needs to be figured out later.