```
% This program computes 1 set of 4 RSS from each of the four BS
```

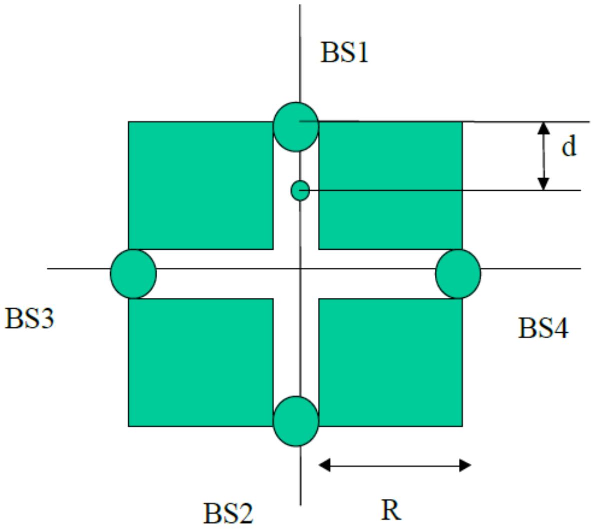
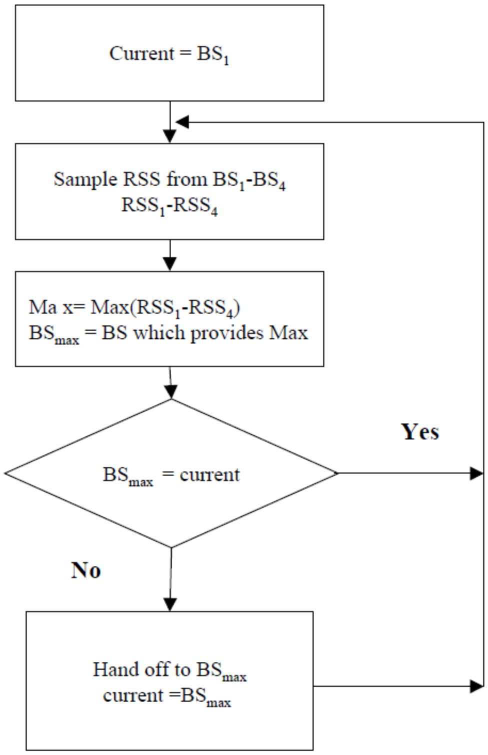


Figure-1 Four Base Station Scenario

```
clc; clear; close all;

% Declare the various variables used for distances
R = 250;
L = 2 * R;
speed = 1;
sample_time = 0.1;
step_distance = speed * sample_time;
g = 150;
min_distance = sqrt(g);
max_distance = L - sqrt(g);
d1 = (min_distance:step_distance:max_distance);
d2 = L - d1;
d3 = abs(R - d1);
d4 = abs(R - d1);
Ns = length(d1);

% Declare variables and compute RSS
% Part 1: Computations independant of the random variable
% for shadow fading
Pt = 20;
Po = 38;
grad1 = 2;
grad2 = 2;
alpha = exp(-1/85);
sigma1 = sqrt(8);
sigma2 = sqrt(sigma1^2 * (1 - alpha^2));
RSS01 = Pt - Po - (10 * grad1 * log10(d1) + 10 * grad2 * log10(d1/g));
RSS02 = Pt - Po - (10 * grad1 * log10(d2) + 10 * grad2 * log10(d2/g));
RSS_corner = Pt - Po - (10 * grad1 * log10(R) + 10 * grad2 * log10(R/g));
RSS03 = RSS_corner - (10 * grad1 * log10(d3) + 10 * grad2 * log10(d3/g));
```

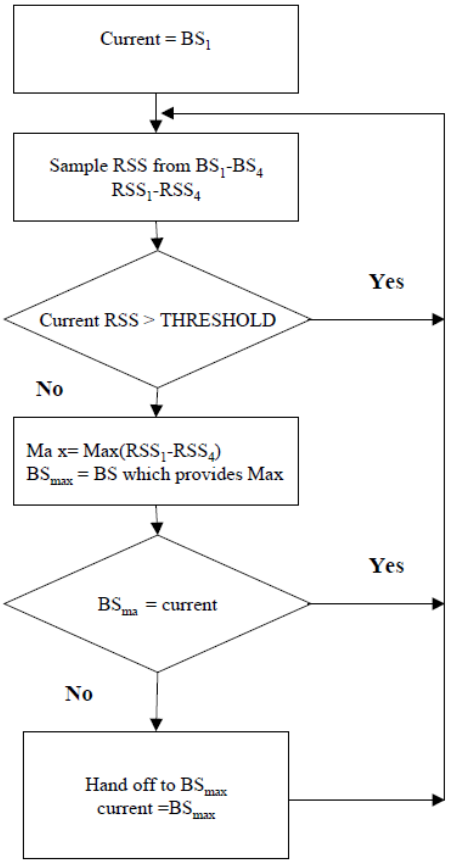
```
RSS04 = RSS_corner - (10 * grad1 * log10(d4) + 10 * grad2 * log10(d4/g));

for i=1:Ns
    if d3(i) < min_distance
        RSS03(i) = RSS_corner;
    end

    if d4(i) < min_distance
        RSS04(i) = RSS_corner;
    end
end

% preallocating the random variable for shadow fading
s1 = zeros(1,Ns);
s2 = zeros(1,Ns);
s3 = zeros(1,Ns);
s4 = zeros(1,Ns);

N     = 100;    % number of trials
thres = -68;
H     = 5  ;

% for storing number of hand-offs
n_ho1   = zeros(1,N);
n_ho2   = zeros(1,N);
n_ho3   = zeros(1,N);
n_ho4   = zeros(1,N);
% for storing location of hand-offs
loc_ho1 = [];
loc_ho2 = [];
loc_ho3 = [];
loc_ho4 = [];

for k=1:N

    % Part 2: Adding the random variable for shadow fading

    s1(1) = sigma1 * randn(1);
    s2(1) = sigma1 * randn(1);
    s3(1) = sigma1 * randn(1);
    s4(1) = sigma1 * randn(1);
    for i=2:Ns
        s1(i) = alpha * s1(i-1) + sigma2 * randn(1);
        s2(i) = alpha * s2(i-1) + sigma2 * randn(1);
        s3(i) = alpha * s3(i-1) + sigma2 * randn(1);
        s4(i) = alpha * s4(i-1) + sigma2 * randn(1);
    end
    RSS1 = RSS01 + s1;
    RSS2 = RSS02 + s2;
    RSS3 = RSS03 + s3;
    RSS4 = RSS04 + s4;

    RSS = [RSS1; RSS2; RSS3; RSS4];
    %%%%%%%%%%%%%%%%%%%%%%%%%%
```

```
% simple RSS
%%%%%%%%%%%%%%%%%%%%%%%%%%
current = RSS(1,:);
n = 0;
for j=1:Ns
    current_RSS = current(j);
    [RSS_max, ind] = max([RSS1(j), RSS2(j), RSS3(j), RSS4(j)]);
    if RSS_max > current_RSS
        current_RSS = RSS_max;
        current = RSS(ind,:);
        n = n + 1;
        loc_ho1 = [loc_ho1 d1(j)];  %#ok
    end
end
n_ho1(k) = n;
```



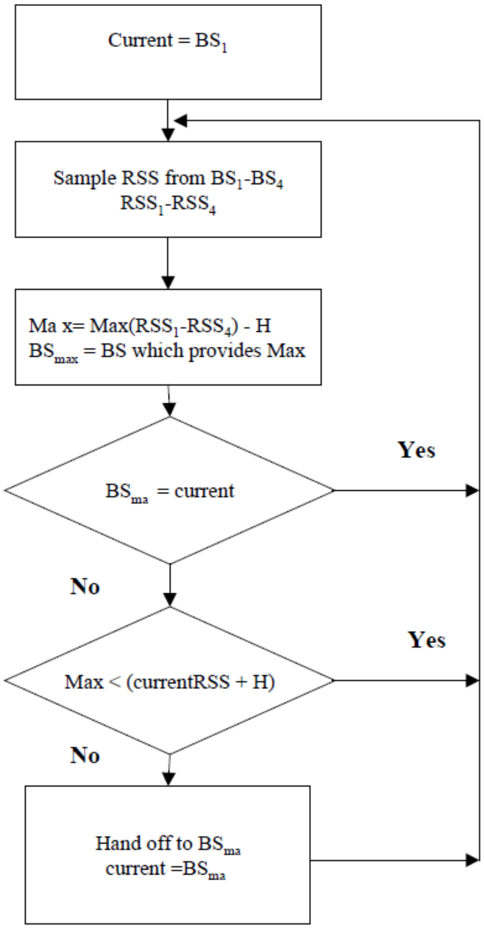
a - Simple RSS

```
%%%%%%%%%%%%%%%%%%%%%%%%%%
% RSS with thres
%%%%%%%%%%%%%%%%%%%%%%%%%%
current = RSS(1,:);
n = 0;
for j=1:Ns
    current_RSS = current(j);
    [RSS_max, ind] = max([RSS1(j), RSS2(j), RSS3(j), RSS4(j)]);
    if current_RSS < thres
        if RSS_max > current_RSS
            current_RSS = RSS_max;
            current = RSS(ind,:);
            n = n + 1;
            loc_ho2 = [loc_ho2 d1(j)];  %#ok
        end
    end
end
n_ho2(k) = n;
```



b - RSS with Threshold

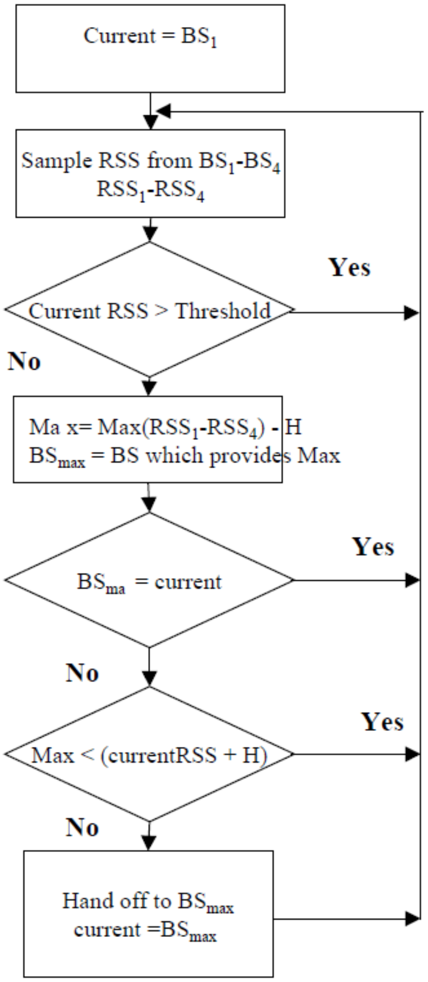
```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% RSS and Hystersis algorithm
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
current = RSS(1,:);
n = 0;
for j=1:Ns
    current_RSS = current(j);
    [RSS_max, ind] = max([RSS1(j), RSS2(j), RSS3(j), RSS4(j)]);
    RSS_max = RSS_max - H;
    if RSS_max > current_RSS + H
        current_RSS = RSS_max;
        current = RSS(ind,:);
        n = n + 1;
        loc_ho3 = [loc_ho3 d1(j)];  %#ok
    end
end
n_ho3(k) = n;
```



c - RSS and Hysteresis

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% RSS with thres and Hystersis algorithm
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
current = RSS(1,:);
n = 0;
for j=1:Ns
    current_RSS = current(j);
    if current_RSS < thres
        [RSS_max, ind] = max([RSS1(j), RSS2(j), RSS3(j), RSS4(j)]);
        RSS_max = RSS_max - H;
        if RSS_max > current_RSS + H
            current_RSS = RSS_max;
```

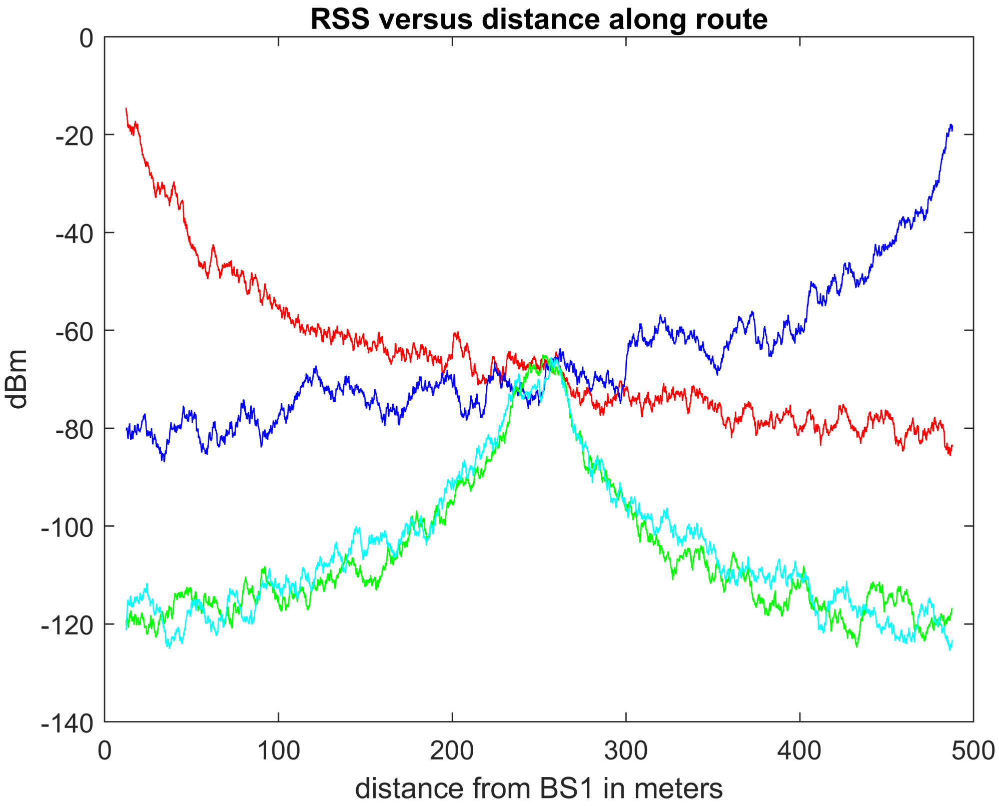
```
                current = RSS(ind,:);
                n = n + 1;
                loc_ho3 = [loc_ho3 d1(j)];  %#ok
            end
        end
    end
    n_ho3(k) = n;
```



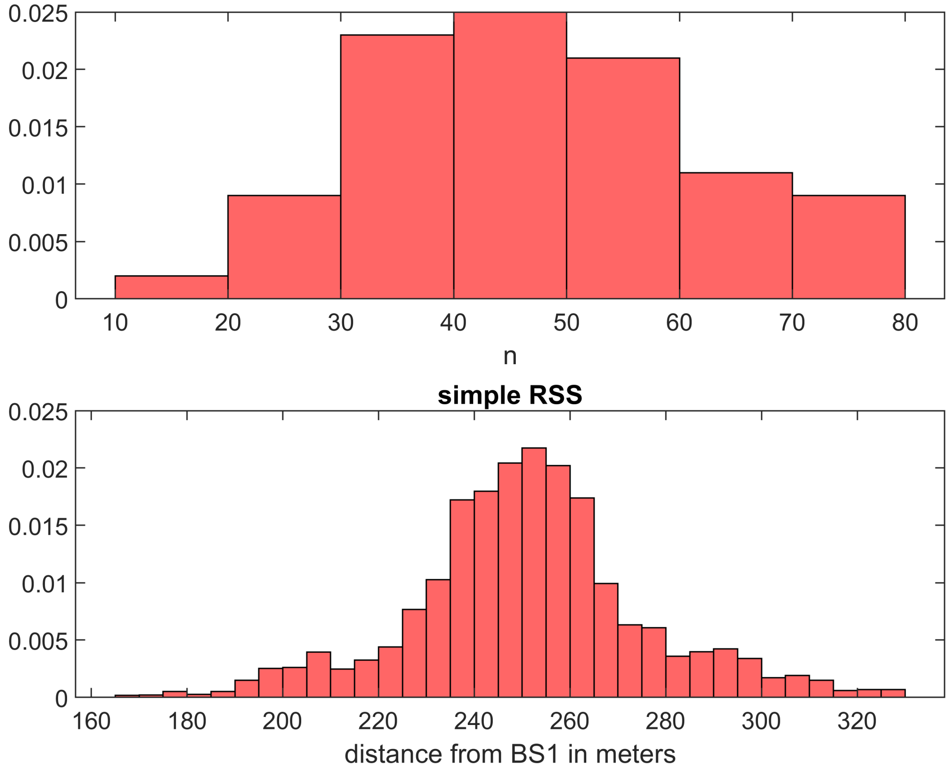
d - RSS, Threshold and Hysteresis

```
end


% Plot the RSS values obtained
figure("Name",'RSS value')
plot(d1, RSS1,'r')
hold on
plot(d1, RSS2,'b')
hold on
plot(d1, RSS3,'g')
hold on
plot(d1, RSS4,'c')
title('RSS versus distance along route')
```

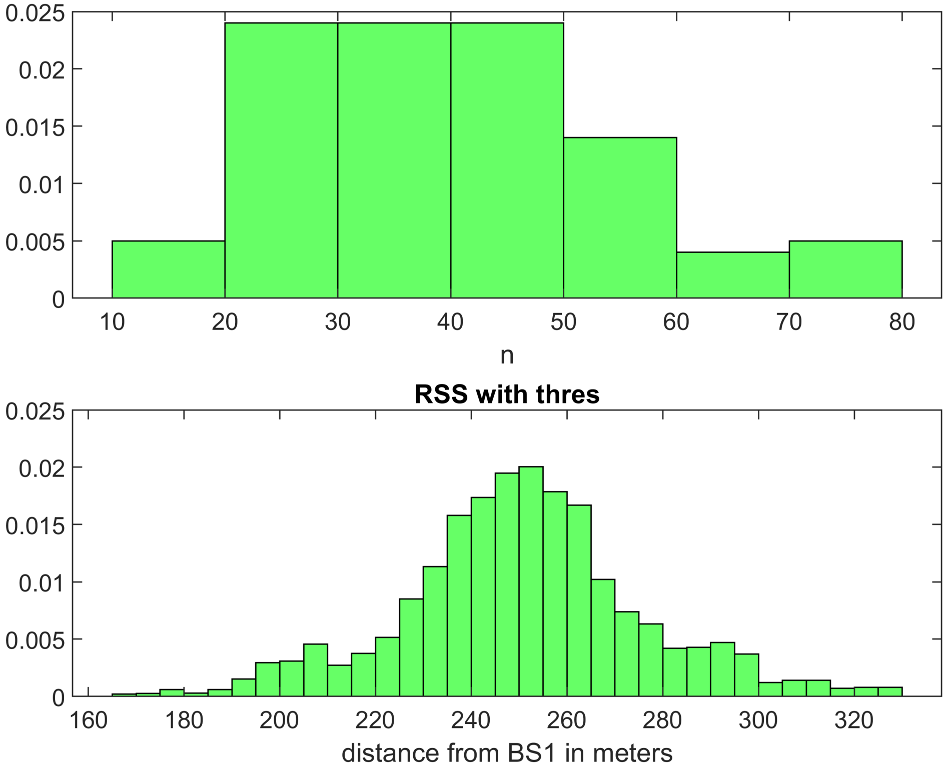
```
xlabel('distance from BS1 in meters');
ylabel('dBm');
```



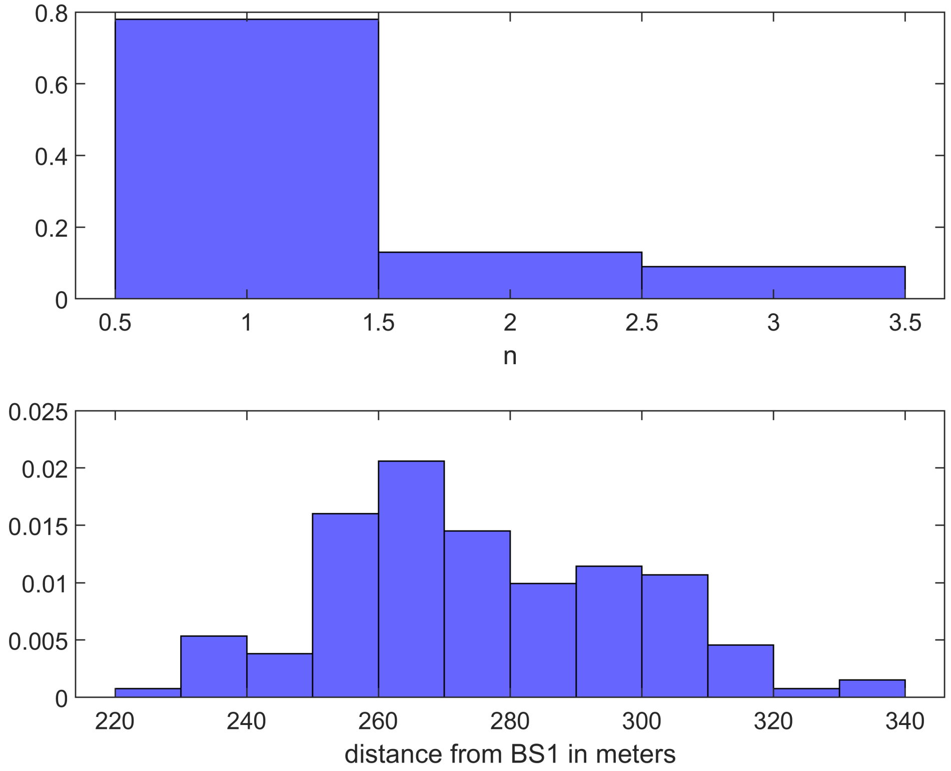
```
% Plot PDF(histogram) of hand-offs
figure("Name",'simple RSS')
subplot(211)
histogram(n_ho1, 'FaceColor', 'r', Normalization='pdf')
xlabel('n')
subplot(212)
histogram(loc_ho1, 'FaceColor', 'r', Normalization='pdf')
xlabel('distance from BS1 in meters');
title('simple RSS')
```



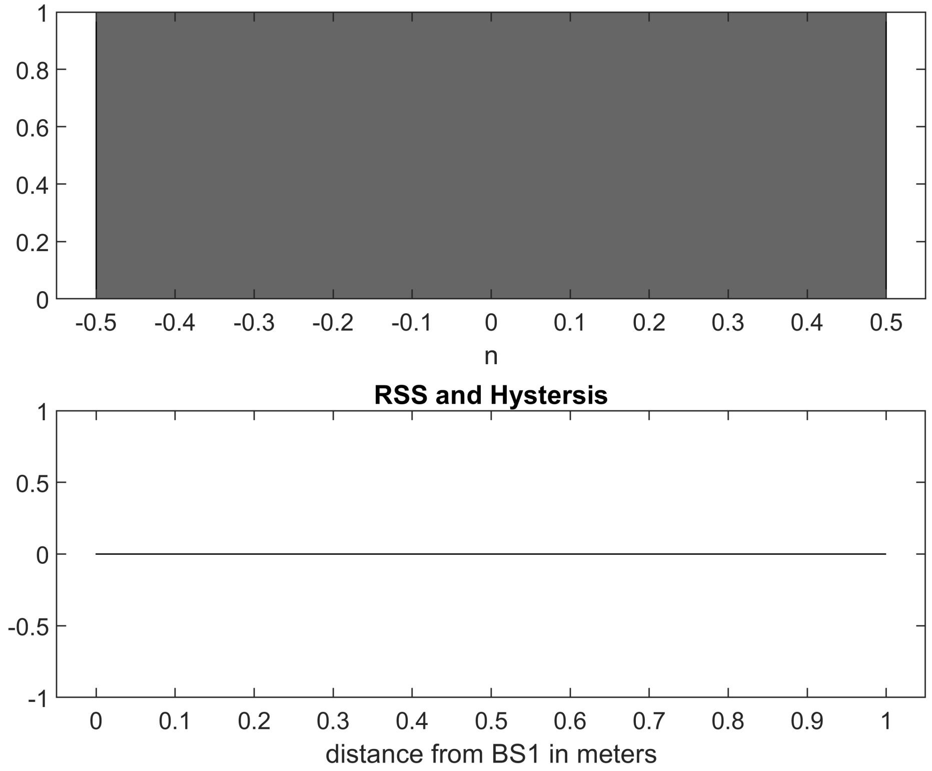
```
figure("Name",'thresh')
subplot(211)
histogram(n_ho2, 'FaceColor', 'g', Normalization='pdf')
xlabel('n')
subplot(212)
histogram(loc_ho2, 'FaceColor', 'g', Normalization='pdf')
xlabel('distance from BS1 in meters');
title('RSS with thres')
```



```
figure("Name", " Hyster")
subplot(211)
histogram(n_ho3, 'FaceColor', 'b', Normalization='pdf')
xlabel('n')
subplot(212)
histogram(loc_ho3, 'FaceColor', 'b', Normalization='pdf')
xlabel('distance from BS1 in meters');
```



```
figure("Name",'thres and Hystersis')
title('RSS with thres and Hystersis')
subplot(211)
histogram(n_ho4, 'FaceColor', 'k', Normalization='pdf')
xlabel('n')
subplot(212)
histogram(loc_ho4, 'FaceColor', 'k', Normalization='pdf')
xlabel('distance from BS1 in meters');
title('RSS and Hystersis')
```


1
0.8
0.6
0.4
0.2
0
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5
n
RSS and Hystersis
1
0.5
0
-0.5
-1
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
distance from BS1 in meters