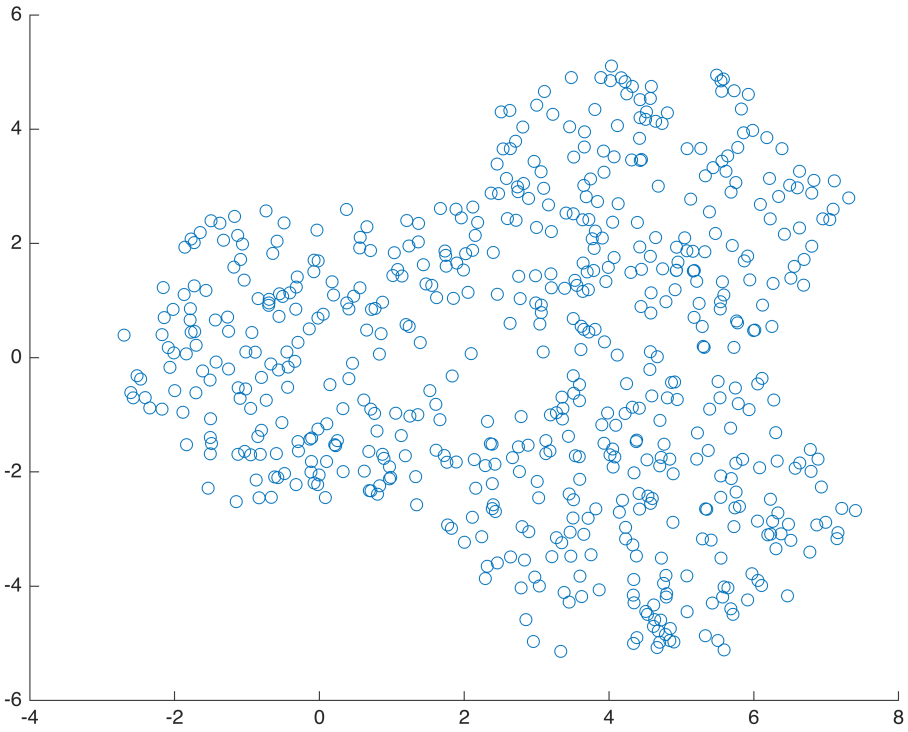
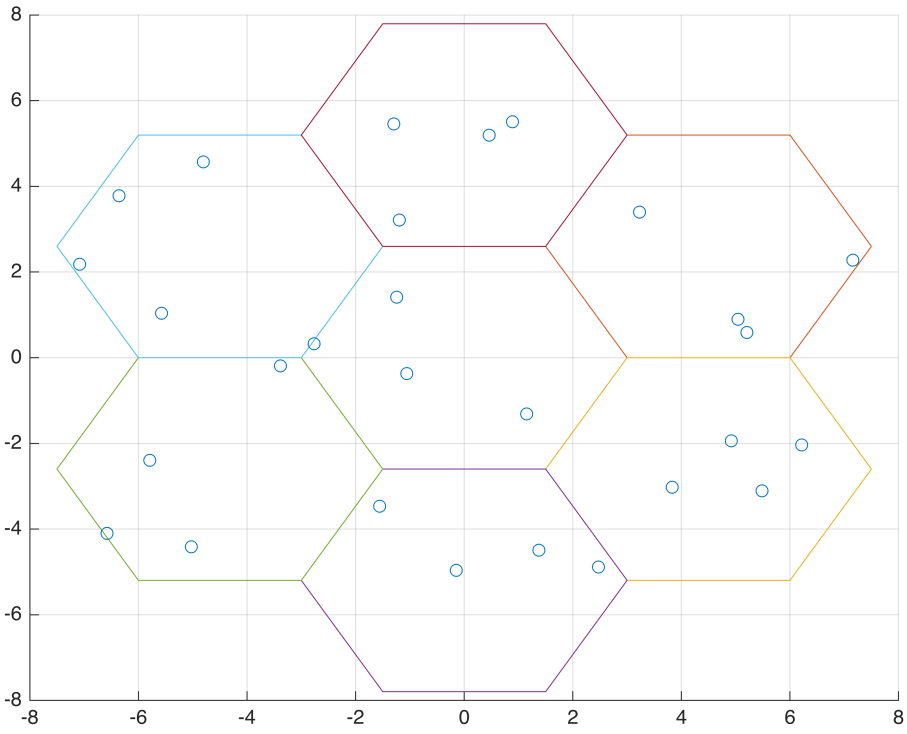
Illustrative Test

```
r = 3;
k = 200;
l = 3;

network = Network(r, k, l);
points = network.getUsers();
scatter(points(:, 1), points(:, 2))
```

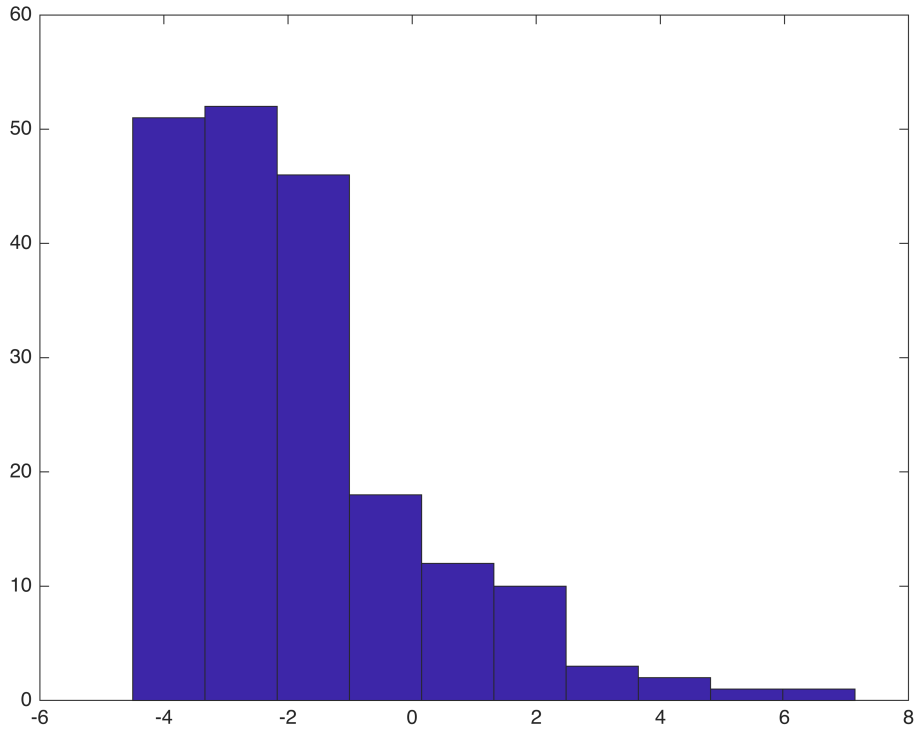


Realistic Test

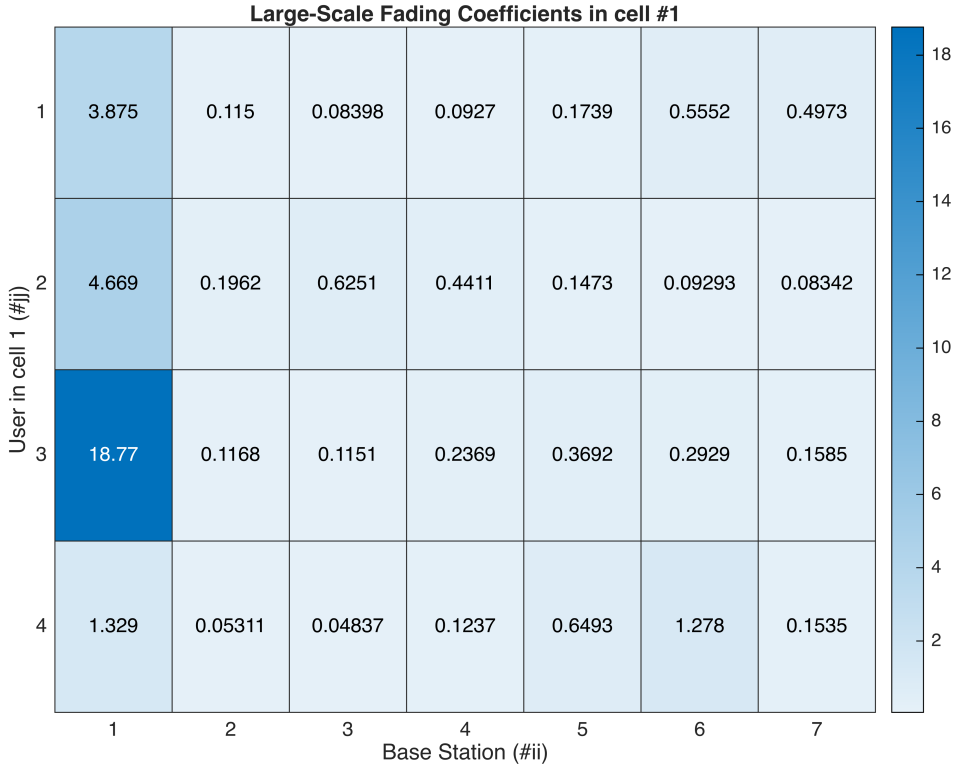
```
r = 3;
k = 4;
l = 7;

network = Network(r, k, l);
points = network.getUsers();
figure
network.tracePerimeters(true);
hold on
scatter(points(:, 1), points(:, 2))
hold off
grid on
```

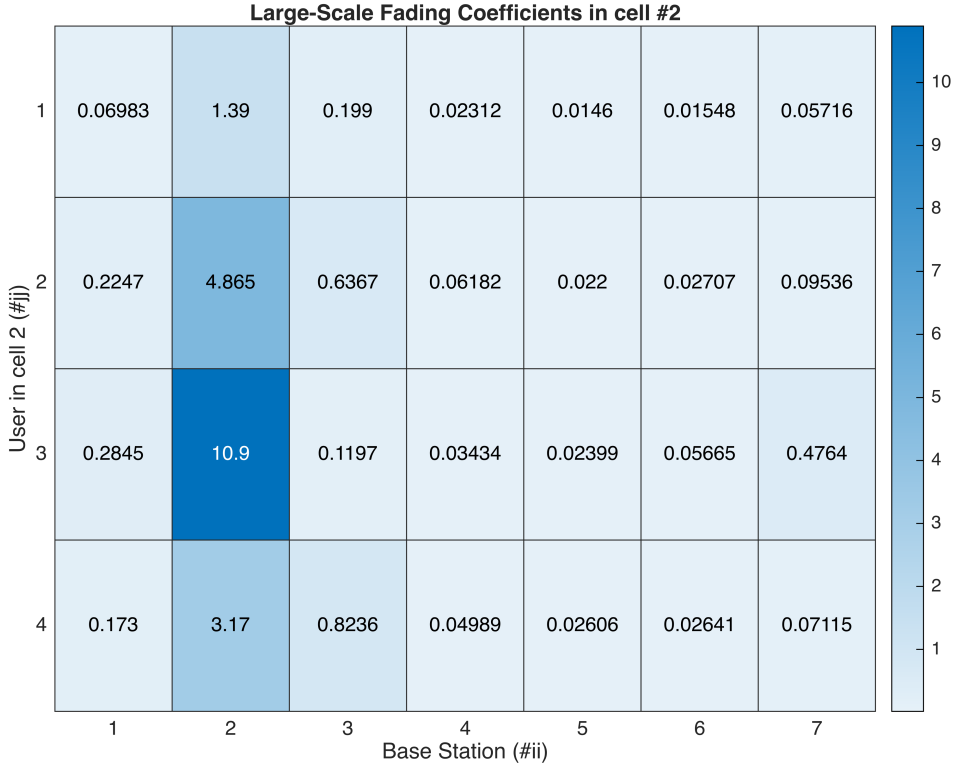


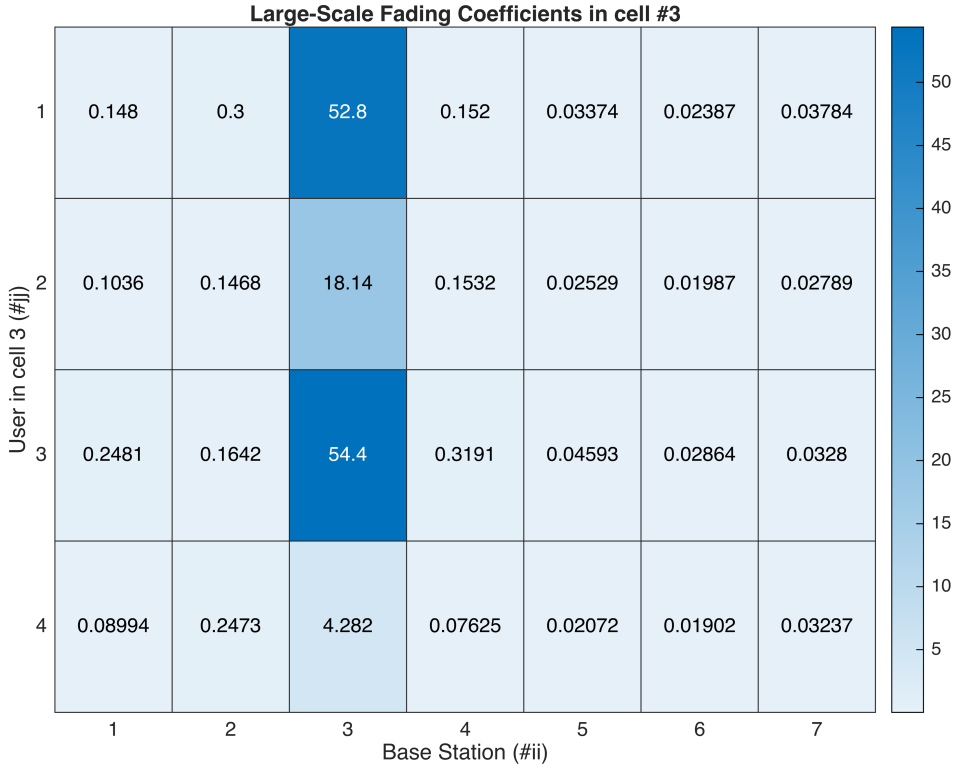

```
lsfcs = network.calculateLSFCs();
hist(log(lsfcs(:)))
```

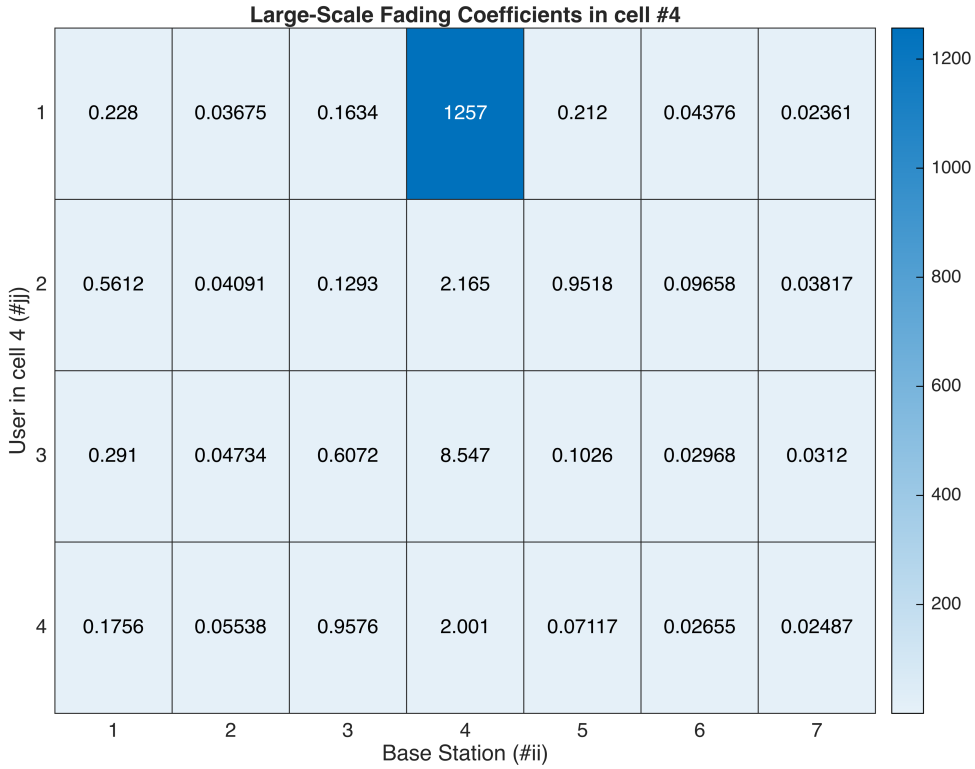


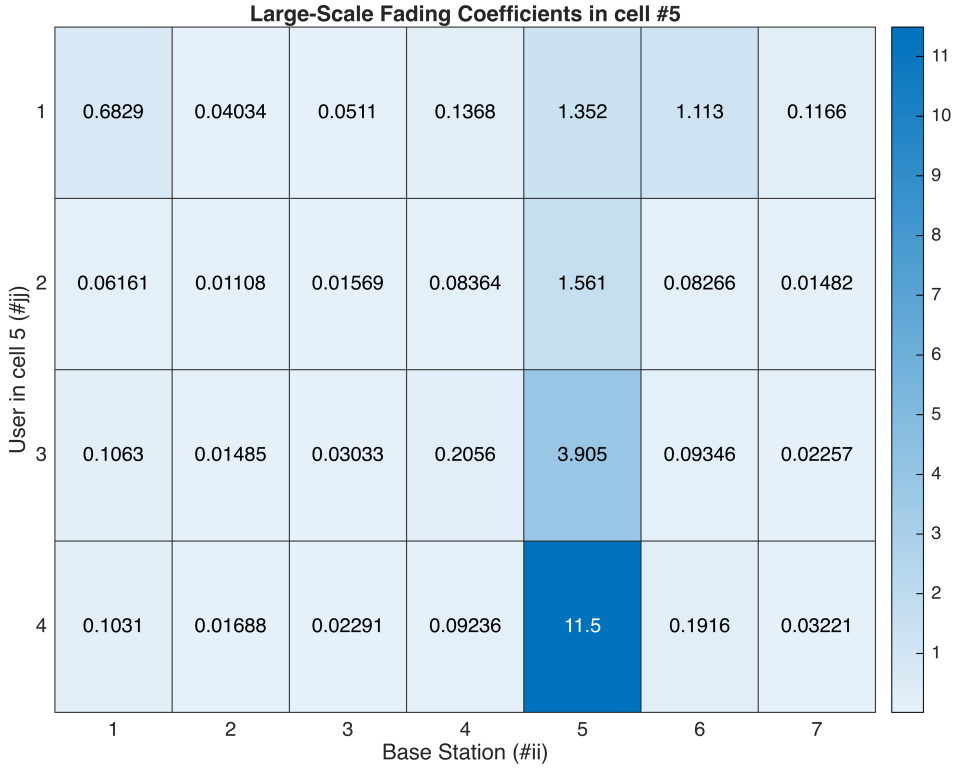

```
for ii = 1:l
    figure
    heatmap(squeeze(lsfcs(:, ii, :)))
    xlabel("Base Station (#ii)")
    ylabel("User in cell " + ii + " (#jj)")
    title("Large-Scale Fading Coefficients in cell #" + ii)
end
```

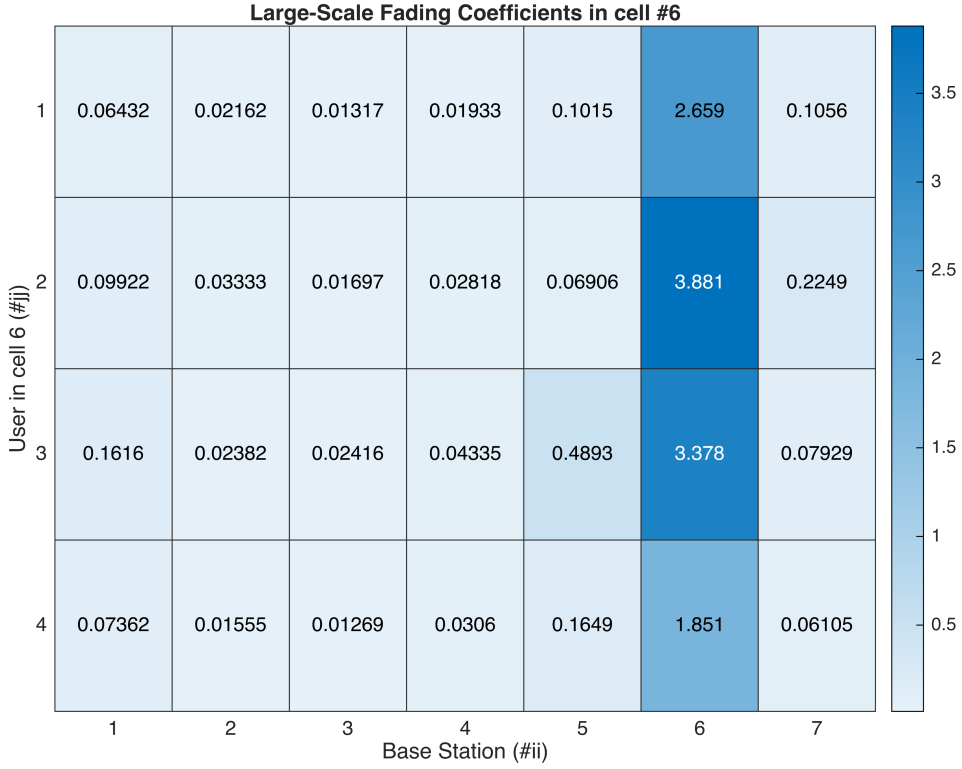

Large-Scale Fading Coefficients in cell #1
User in cell 1 (#jj)
Base Station (#ii)
1 3.875 0.115 0.08398 0.0927 0.1739 0.5552 0.4973
2 4.669 0.1962 0.6251 0.4411 0.1473 0.09293 0.08342
3 18.77 0.1168 0.1151 0.2369 0.3692 0.2929 0.1585
4 1.329 0.05311 0.04837 0.1237 0.6493 1.278 0.1535
1 2 3 4 5 6 7
18 16 14 12 10 8 6 4 2

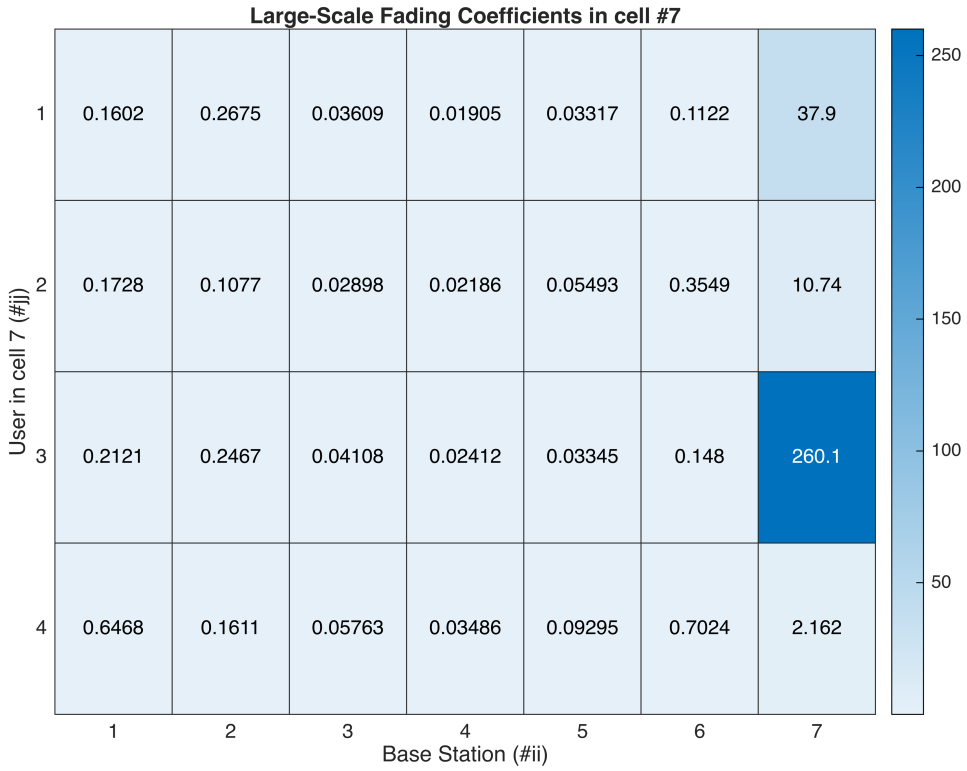

Large-Scale Fading Coefficients in cell #2
User in cell 2 (#jj)
Base Station (#ii)
1 0.06983 1.39 0.199 0.02312 0.0146 0.01548 0.05716
2 0.2247 4.865 0.6367 0.06182 0.022 0.02707 0.09536
3 0.2845 10.9 0.1197 0.03434 0.02399 0.05665 0.4764
4 0.173 3.17 0.8236 0.04989 0.02606 0.02641 0.07115
1 2 3 4 5 6 7
10 9 8 7 6 5 4 3 2 1


Large-Scale Fading Coefficients in cell #3
User in cell 3 (#jj)
1
2
3
4
0.148
0.3
52.8
0.152
0.03374
0.02387
0.03784
0.1036
0.1468
18.14
0.1532
0.02529
0.01987
0.02789
0.2481
0.1642
54.4
0.3191
0.04593
0.02864
0.0328
0.08994
0.2473
4.282
0.07625
0.02072
0.01902
0.03237
1
2
3
4
5
6
7
Base Station (#ii)
50
45
40
35
30
25
20
15
10
5


Large-Scale Fading Coefficients in cell #4
User in cell 4 (#jj)
1
2
3
4
0.228
0.03675
0.1634
1257
0.212
0.04376
0.02361
0.5612
0.04091
0.1293
2.165
0.9518
0.09658
0.03817
0.291
0.04734
0.6072
8.547
0.1026
0.02968
0.0312
0.1756
0.05538
0.9576
2.001
0.07117
0.02655
0.02487
1
2
3
4
5
6
7
Base Station (#ii)
1200
1000
800
600
400
200

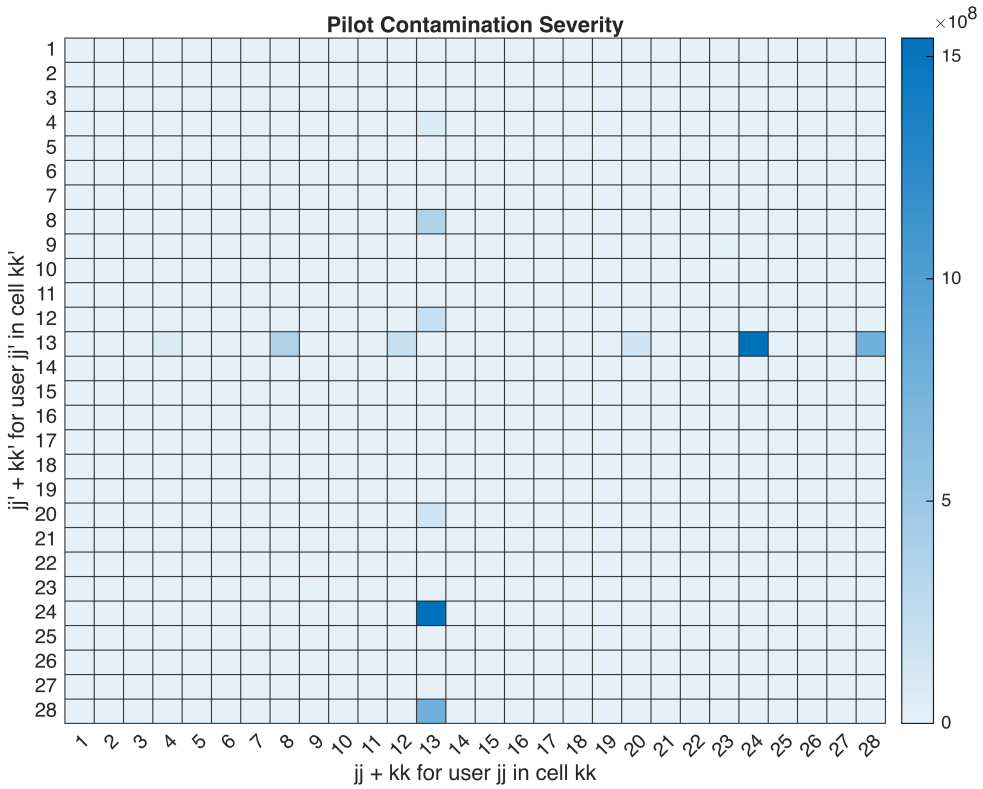

Large-Scale Fading Coefficients in cell #5
User in cell 5 (#jj)
Base Station (#ii)
1 0.6829 0.04034 0.0511 0.1368 1.352 1.113 0.1166
2 0.06161 0.01108 0.01569 0.08364 1.561 0.08266 0.01482
3 0.1063 0.01485 0.03033 0.2056 3.905 0.09346 0.02257
4 0.1031 0.01688 0.02291 0.09236 11.5 0.1916 0.03221
1 2 3 4 5 6 7
11 10 9 8 7 6 5 4 3 2 1


Large-Scale Fading Coefficients in cell #6
User in cell 6 (#jj)
Base Station (#ii)
1 0.06432 0.02162 0.01317 0.01933 0.1015 2.659 0.1056
2 0.09922 0.03333 0.01697 0.02818 0.06906 3.881 0.2249
3 0.1616 0.02382 0.02416 0.04335 0.4893 3.378 0.07929
4 0.07362 0.01555 0.01269 0.0306 0.1649 1.851 0.06105
1 2 3 4 5 6 7
3.5 3 2.5 2 1.5 1 0.5

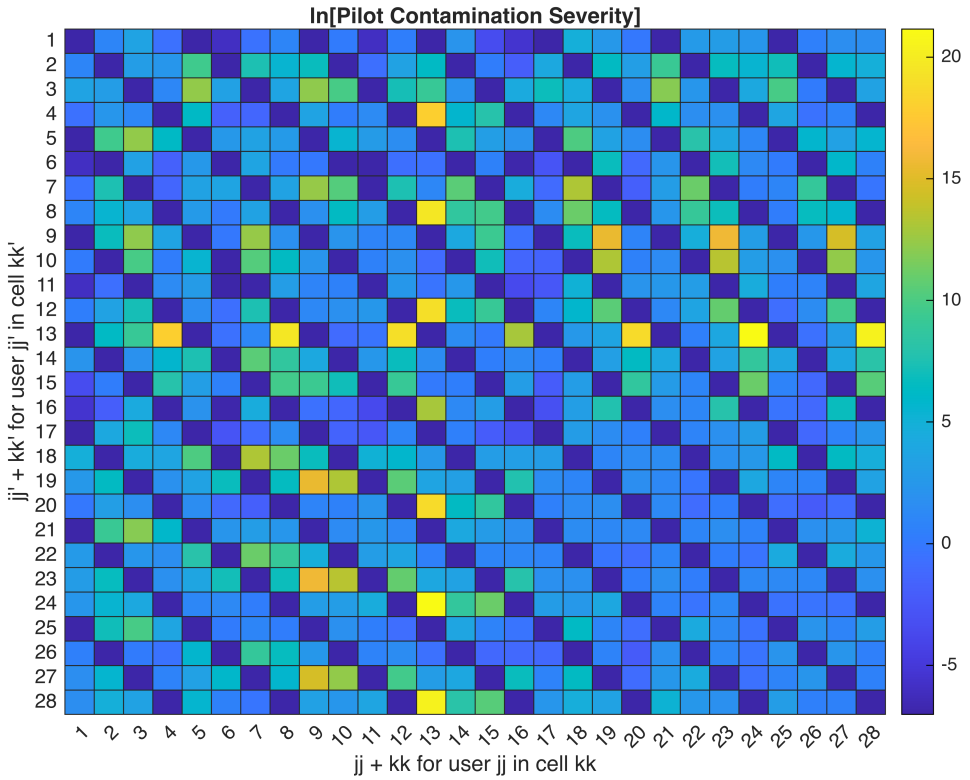


PCS

```
zetas = network.pilotContaminationSeverities(true);
zetas2 = network.pilotContaminationSeverities(false);
figure
heatmap(zetas)
xlabel("jj + kk for user jj in cell kk")
ylabel("jj' + kk' for user jj' in cell kk'")
title("Pilot Contamination Severity")
```




```
figure
heatmap(log(zetas), "Colormap", parula)
xlabel("jj + kk for user jj in cell kk")
ylabel("jj' + kk' for user jj' in cell kk'")
title("ln[Pilot Contamination Severity]")
```


ln[Pilot Contamination Severity]
jj' + kk' for user jj' in cell kk'
jj + kk for user jj in cell kk
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
20
15
10
5
0
-5

Spot Check