Pratik Yadav

818458115

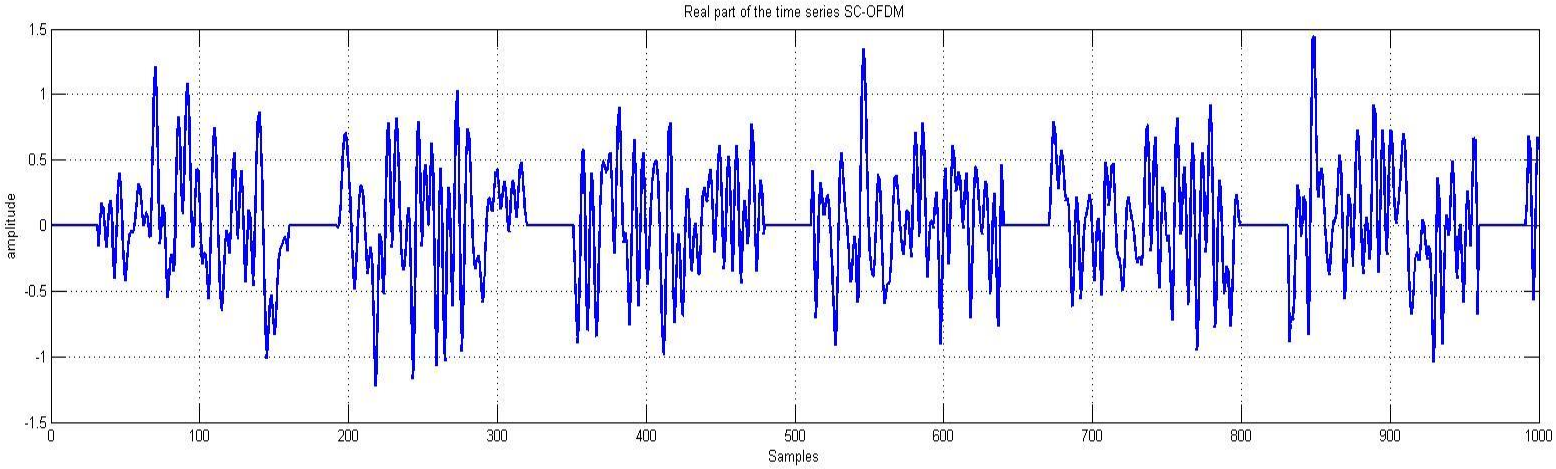
MODEM Design (EE 655)

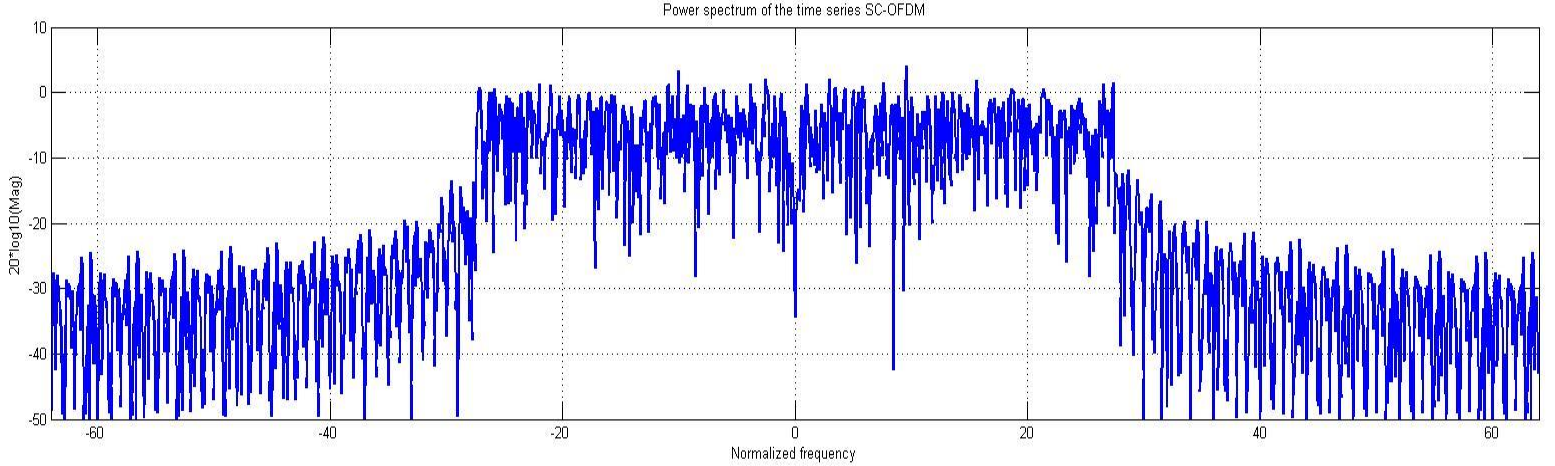
Final

Examination

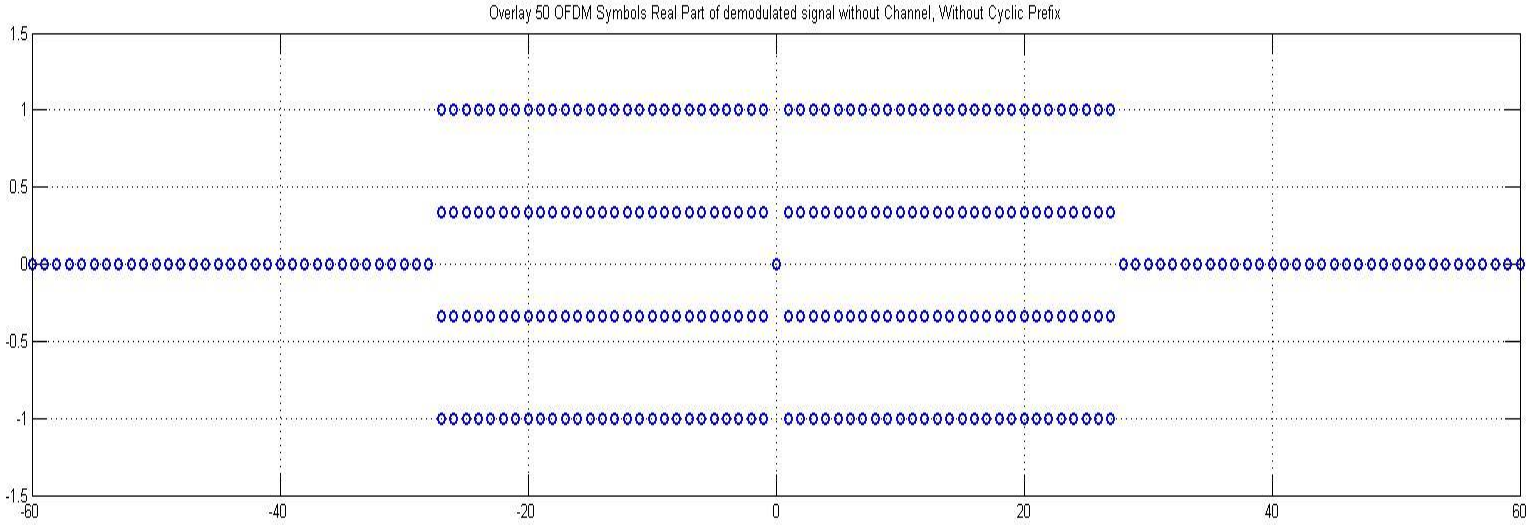
QUESTION 1

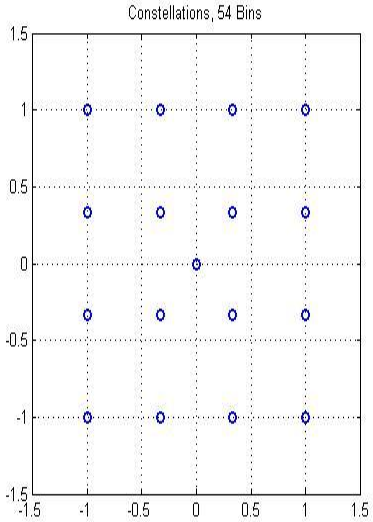
PART A and PART B

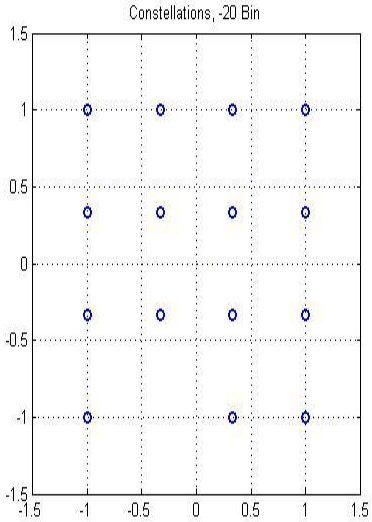


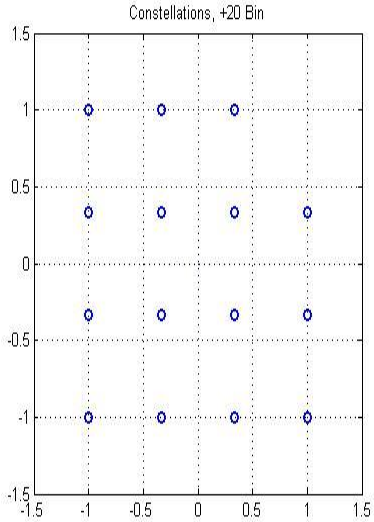


PART C

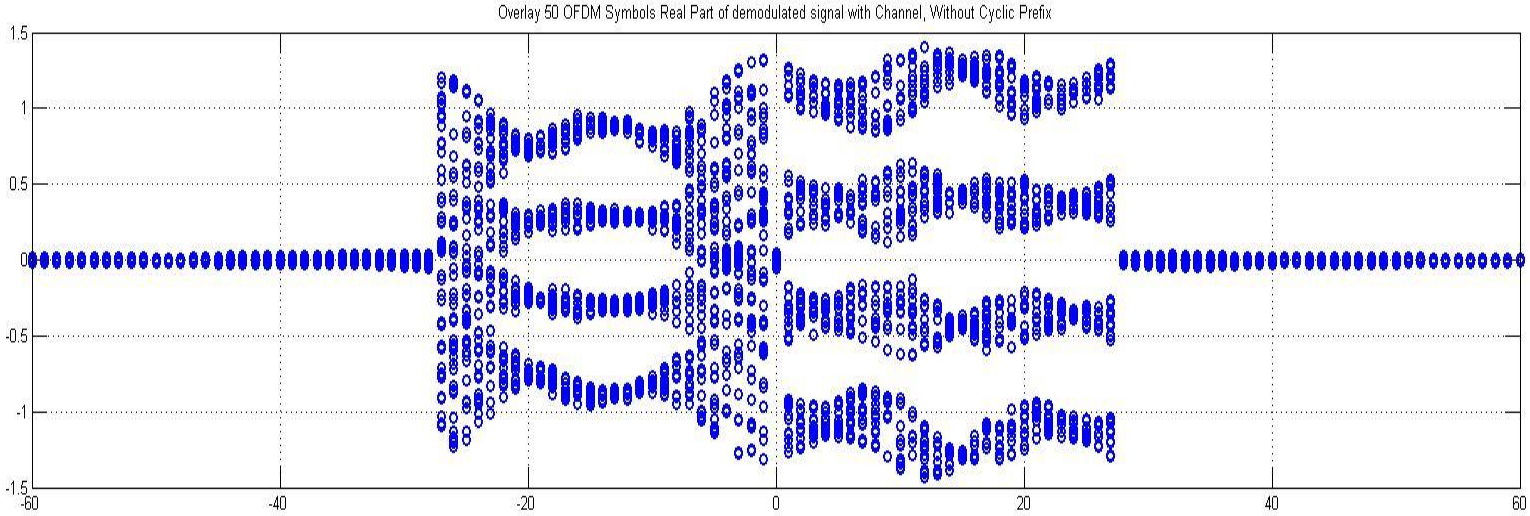

Overlay 50 OFDM Symbols Real Part of demodulated signal without Channel, Without Cyclic Prefix
1.5
1
0.5
0
-0.5
-1
-1.5
-60
-40
-20
0
20
40
60

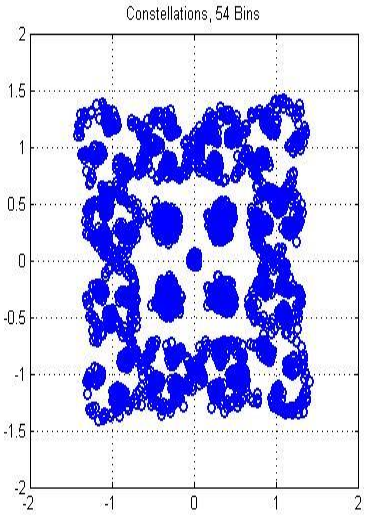

Constellations, 54 Bins
1.5
1
0.5
0
-0.5
-1
-1.5
-1.5
-1
-0.5
0
0.5
1
1.5

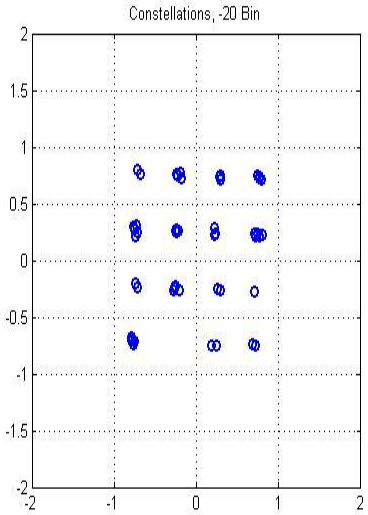

Constellations, -20 Bin
1.5
1
0.5
0
-0.5
-1
-1.5
-1.5
-1
-0.5
0
0.5
1
1.5

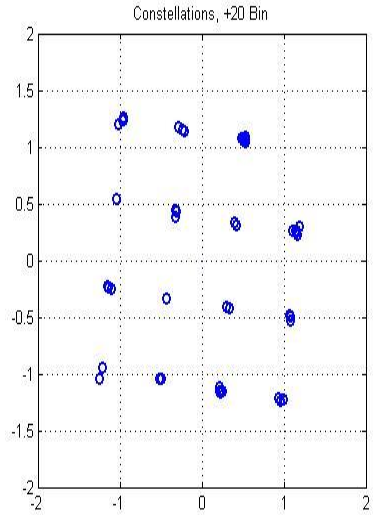

Constellations, +20 Bin
1.5
1
0.5
0
-0.5
-1
-1.5
-1.5
-1
-0.5
0
0.5
1
1.5

PART D

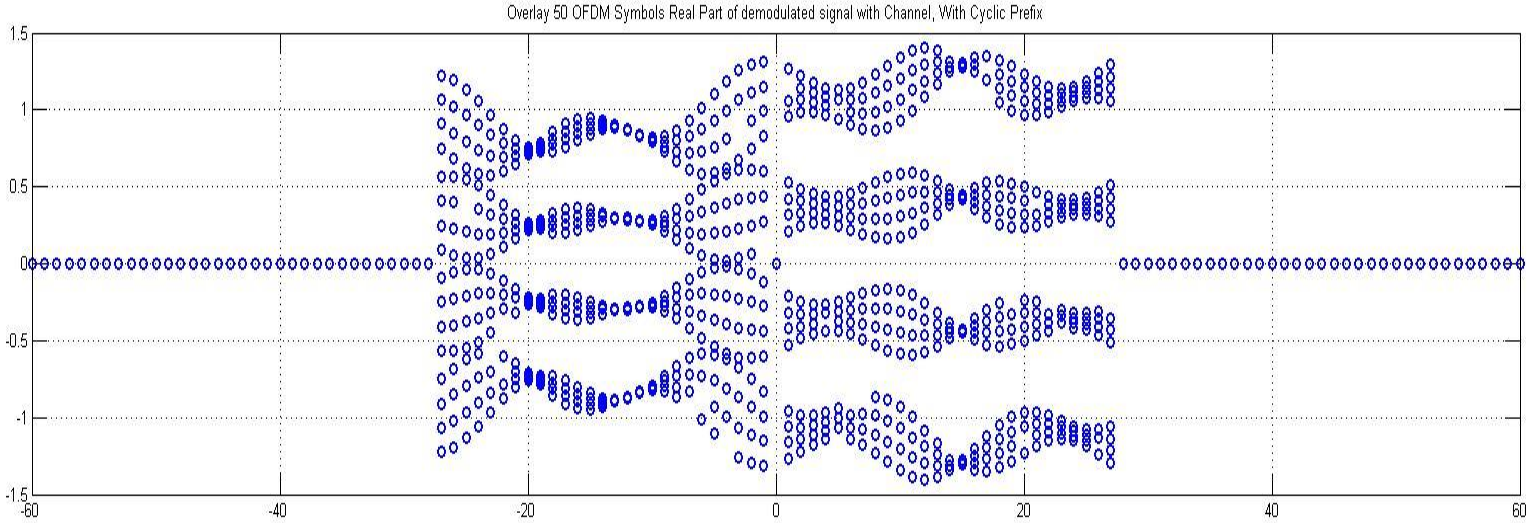

Overlay 50 OFDM Symbols Real Part of demodulated signal with Channel, Without Cyclic Prefix
1.5
1
0.5
0
-0.5
-1
-1.5
-60
-40
-20
0
20
40
60

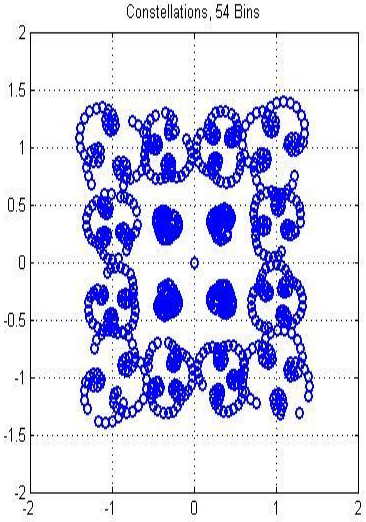

Constellations, 54 Bins
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2

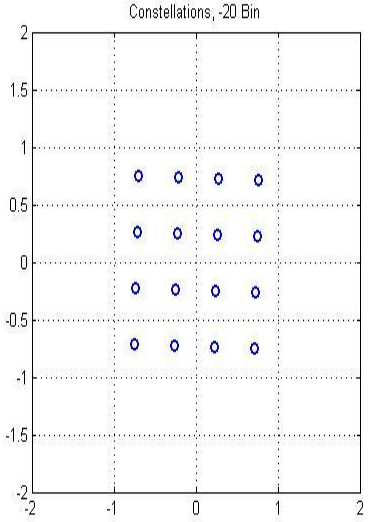

Constellations, -20 Bin
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2

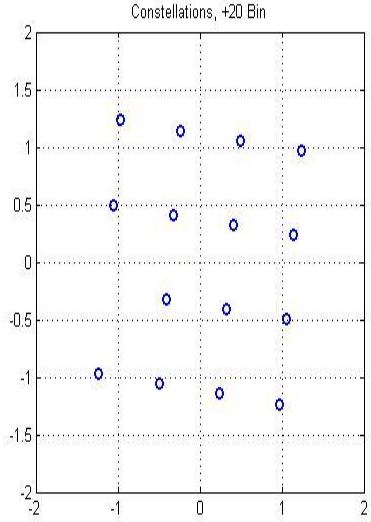

Constellations, +20 Bin
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2

PART E

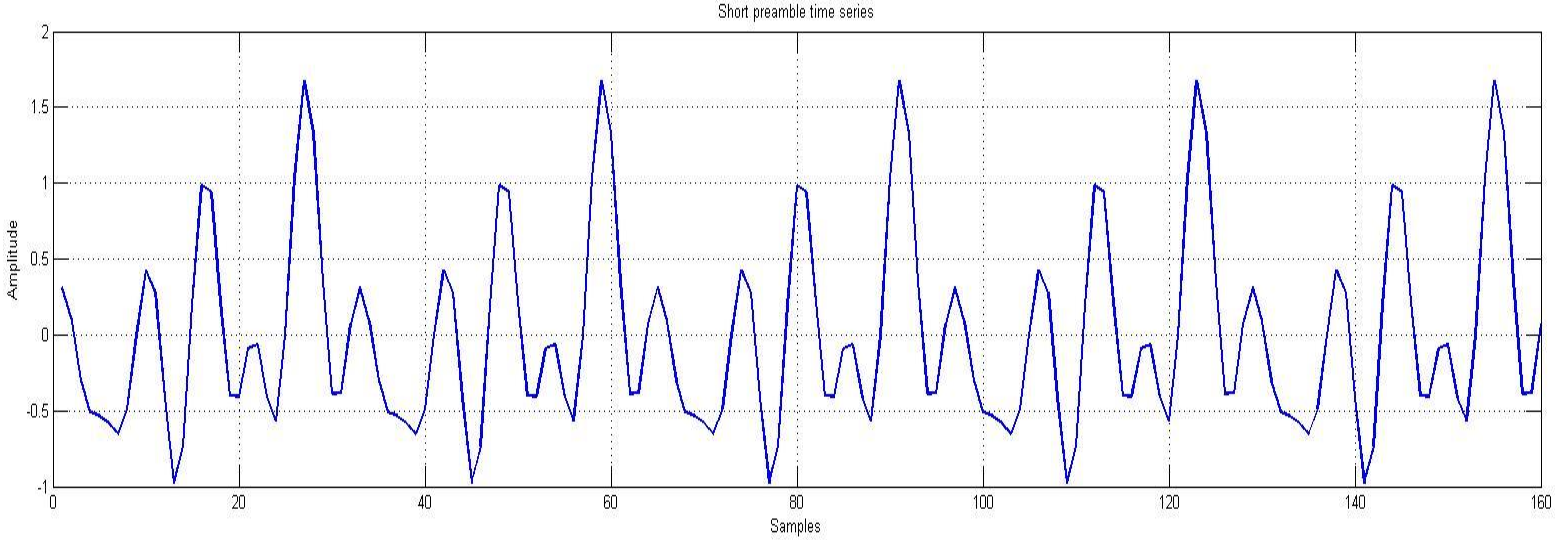

Overlay 50 OFDM Symbols Real Part of demodulated signal with Channel, With Cyclic Prefix
1.5
1
0.5
0
-0.5
-1
-1.5
-60
-40
-20
0
20
40
60

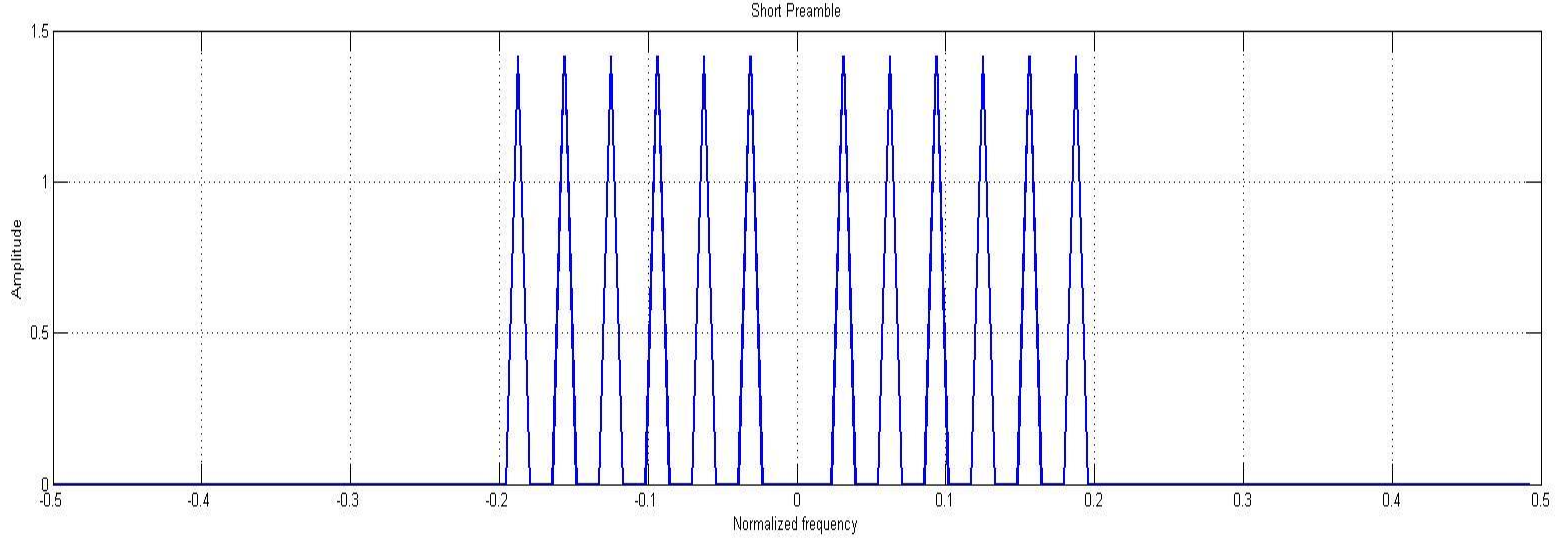

Constellations, 54 Bins
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2

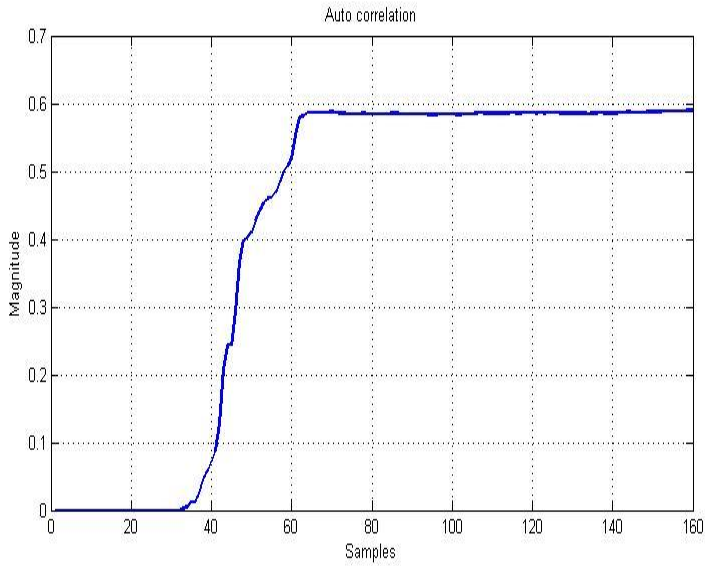

Constellations, -20 Bin
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2

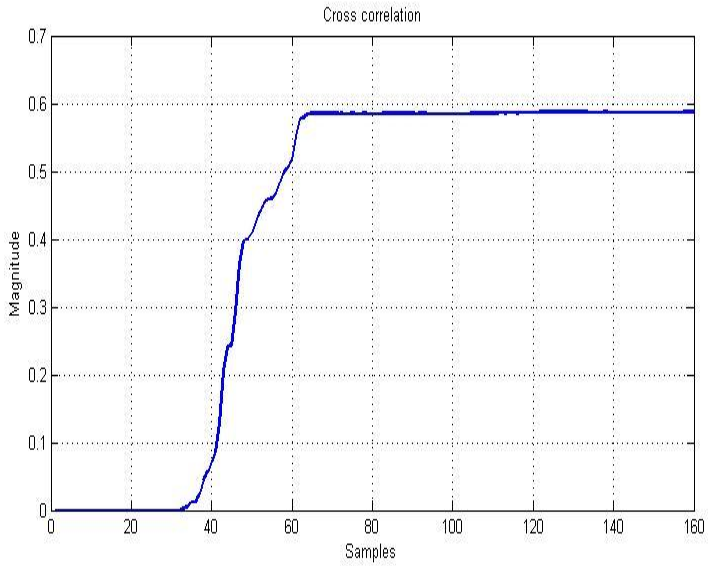

Constellations, +20 Bin
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2

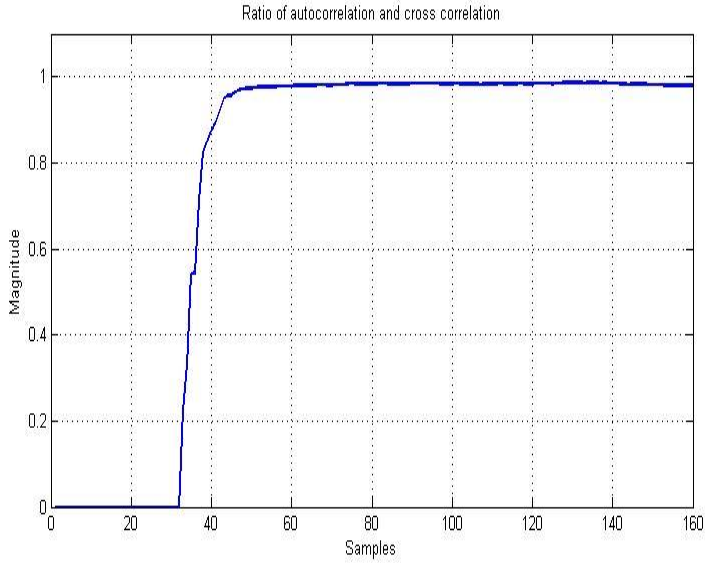
PART F

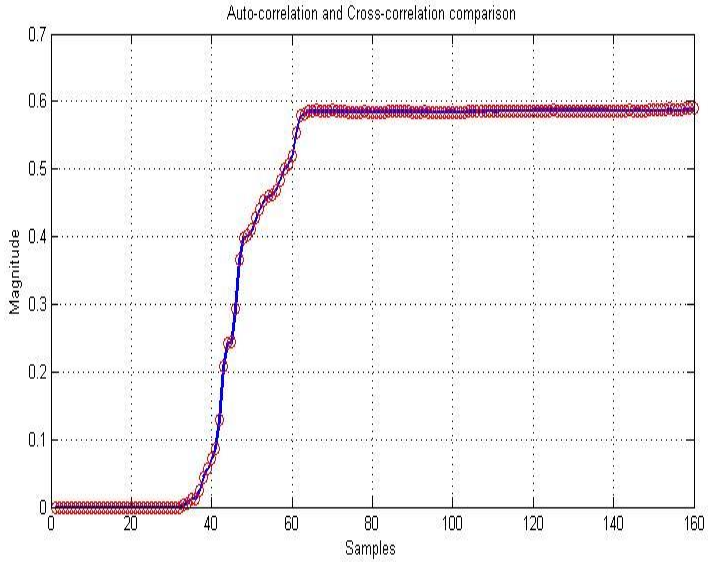

Short preamble time series
Amplitude
Samples
2
1.5
1
0.5
0
-0.5
-1
0
20
40
60
80
100
120
140
160

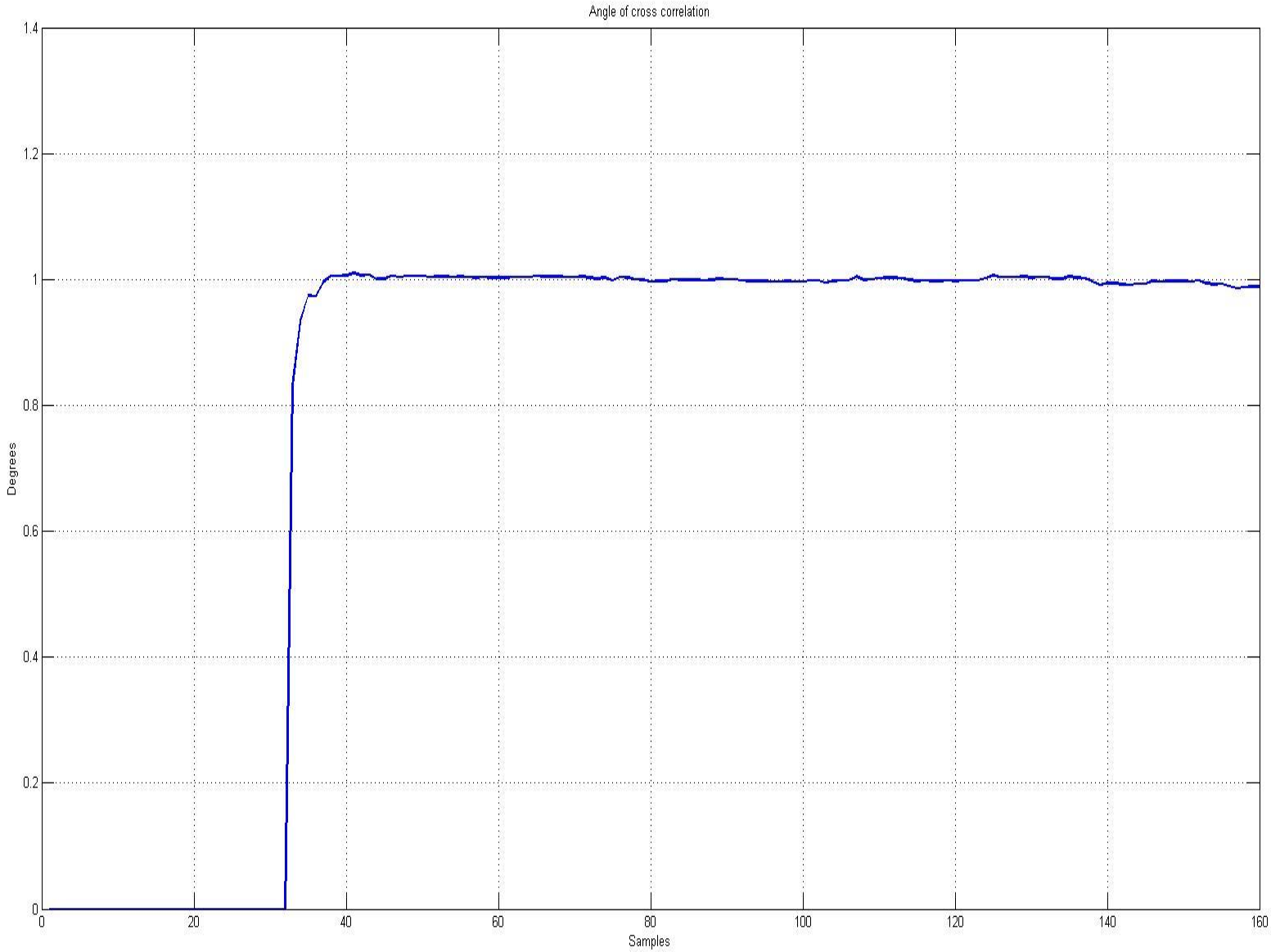

Short Preamble
Amplitude
Normalized frequency
1.5
1
0.5
0
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4
0.5

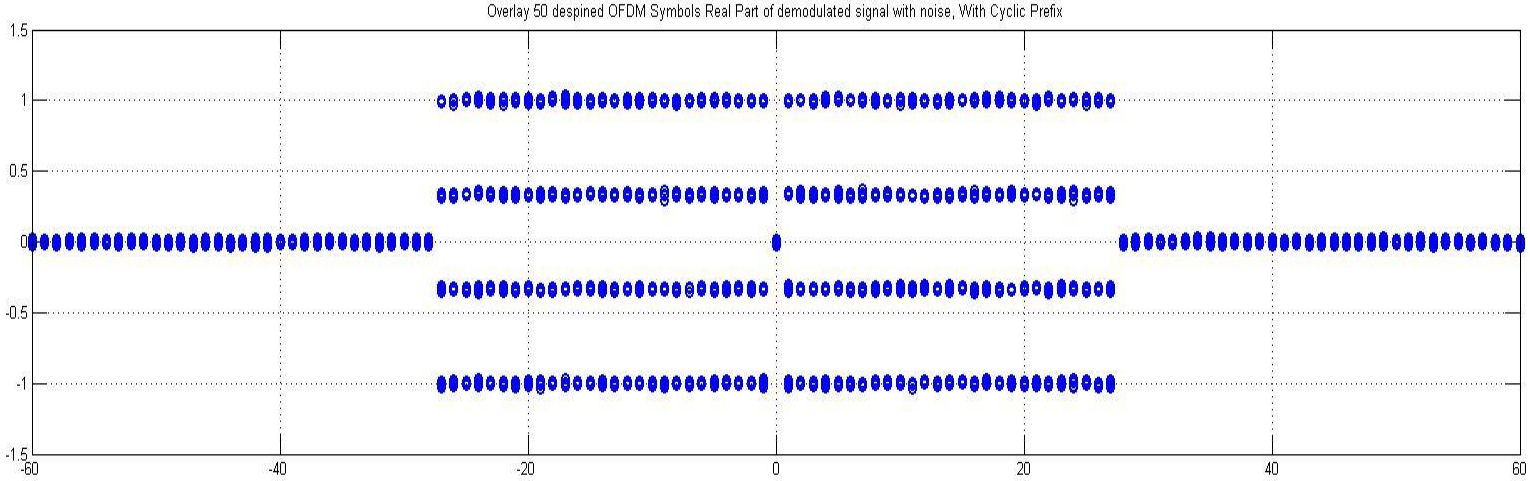

Auto correlation
Magnitude
Samples
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0
20
40
60
80
100
120
140
160

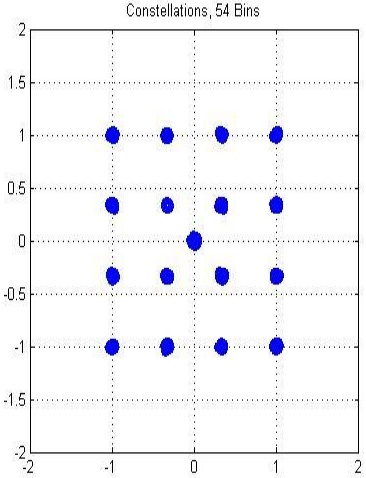

Cross correlation
Magnitude
Samples
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0
20
40
60
80
100
120
140
160

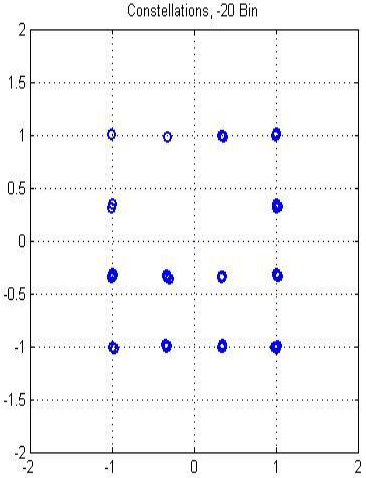

Ratio of autocorrelation and cross correlation
Magnitude
Samples
0
0.2
0.4
0.6
0.8
1
0
20
40
60
80
100
120
140
160

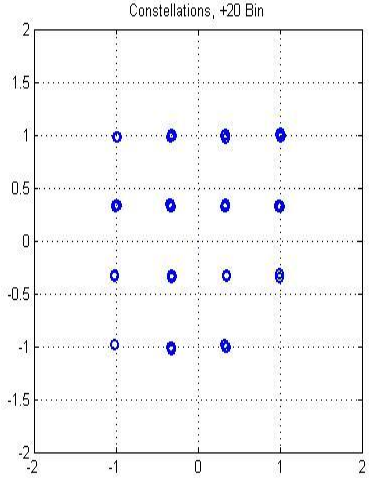

Auto-correlation and Cross-correlation comparison
Magnitude
Samples
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0
20
40
60
80
100
120
140
160


Angle of cross correlation
Degrees
Samples
0
0.2
0.4
0.6
0.8
1
1.2
1.4
0
20
40
60
80
100
120
140
160

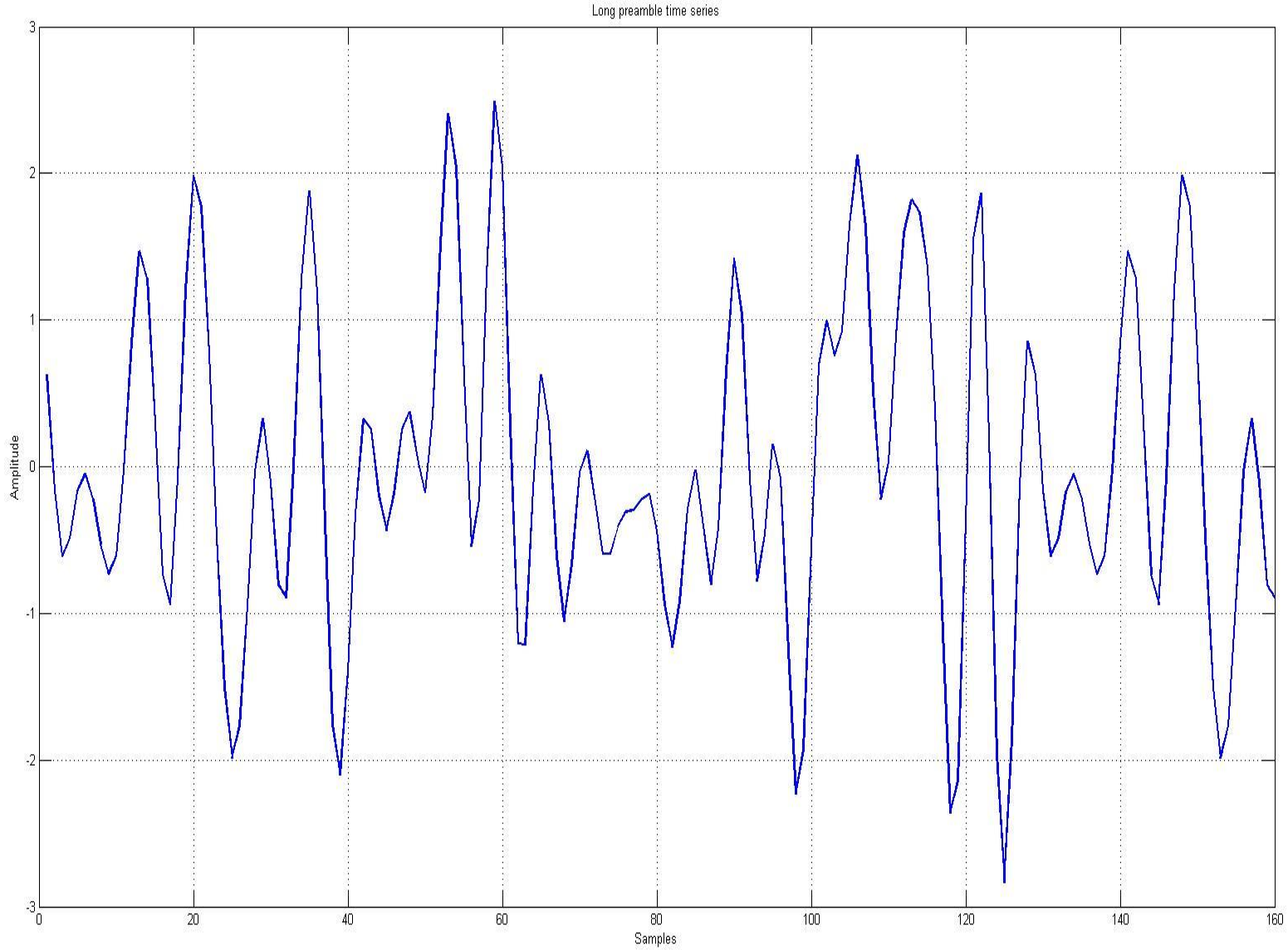

Overlay 50 despined OFDM Symbols Real Part of demodulated signal with noise, With Cyclic Prefix
1.5
1
0.5
0
-0.5
-1
-1.5
-60
-40
-20
0
20
40
60

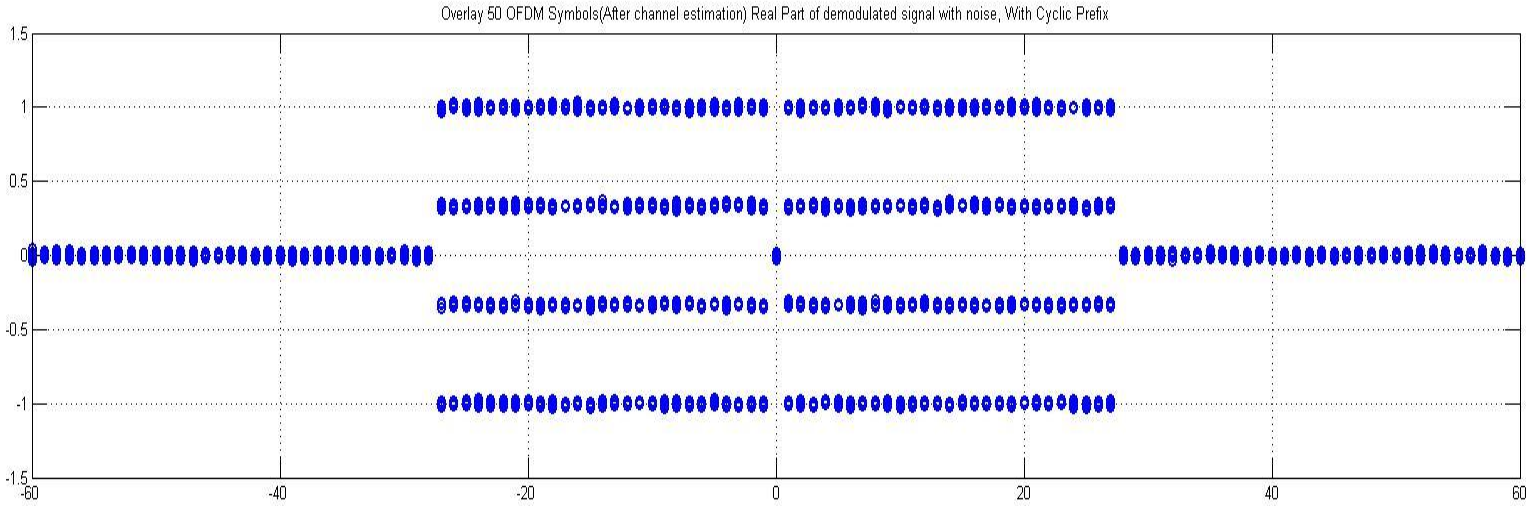

Constellations, 54 Bins
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2

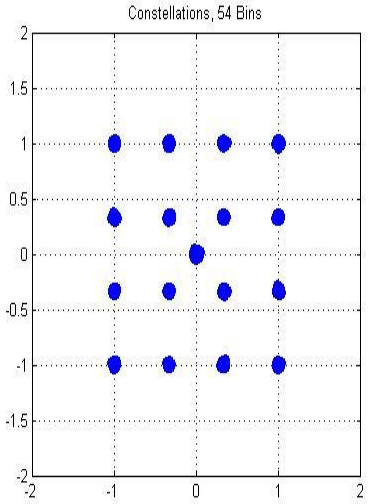

Constellations, -20 Bin
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2

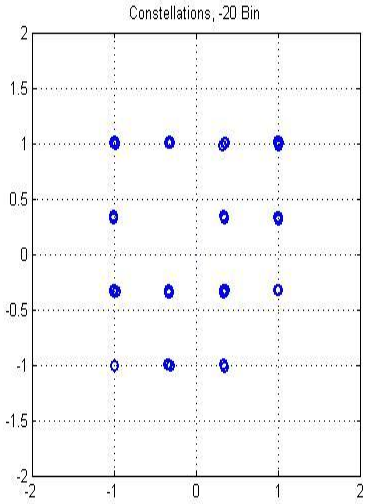

Constellations, +20 Bin
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2

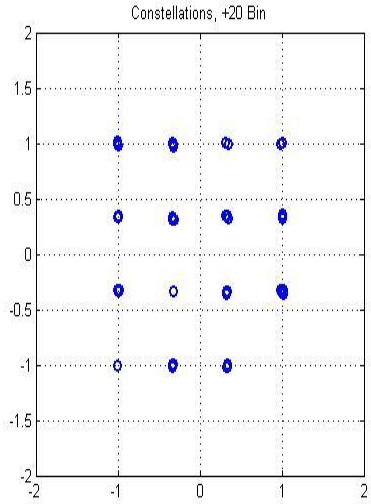
PART G


Long preamble time series
Amplitude
Samples
3
2
1
0
-1
-2
-3
0
20
40
60
80
100
120
140
160


Overlay 50 OFDM Symbols(After channel estimation) Real Part of demodulated signal with noise, With Cyclic Prefix
1.5
1
0.5
0
-0.5
-1
-1.5
-60
-40
-20
0
20
40
60


Constellations, 54 Bins
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2


Constellations, -20 Bin
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2


Constellations, +20 Bin
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1
0
1
2