

Matlab Simulation Example 4: PHY abstraction under 11ax OFDMA SISO system

From Table C-1.3 shown in the following, we show the number of combinations of resource units (RUs). There are four types of RUs differentiated by their sizes (number of subcarriers): RU of size 26, RU of size 52, RU of size 106, RU of size 242. The RU of size 242 in OFDMA is equivalent to the case of 20MHz OFDM (see Allocation index 192). In the following, we only focus on generating the log-SGN parameters for RU of size 26, RU of size 52, and RU of size 106.

Table C-1.3. 11ax Allocation indices and the corresponding RU combinations. Each RU can be occupied by 1 user (the green RU) or multiple users up to 8 (the red RU and blue RU).

Allocation Index	20 MHz Subchannel Resource Unit (RU) Assignment									
0	26	26	26	26	26	26	26	26	26	26
1	26	26	26	26	26	26	26	26	52	
2	26	26	26	26	26		52		26	26
3	26	26	26	26	26		52		52	
4	26	26		52		26	26	26	26	26
5	26	26		52	26	26	26		52	
6	26	26		52	26		52		26	26
7	26	26		52	26		52		52	
8		52	26	26	26	26	26	26	26	26
9		52	26	26	26	26	26	26	52	
10		52	26	26	26		52		26	26
11		52	26	26	26		52		52	
12		52		52	26	26	26	26	26	26
13		52		52	26	26	26		52	
14		52		52	26		52	26	26	26
15		52		52	26		52		52	
16-23 (15 + N)		52		52	-		106 (N users)			
24-31 (23 + N)			106 (N users)		-		52		52	
32-39 (31 + N)	26	26	26	26	26			106 (N users)		
40-47 (39 + N)	26	26		52	26			106 (N users)		
48-55 (47 + N)		52		26	26			106 (N users)		
56-63 (55 + N)		52		52	26			106 (N users)		
64-71 (63 + N)			106 (N users)		26	26	26	26	26	
72-79 (71 + N)			106 (N users)		26	26	26		52	
80-87 (79 + N)			106 (N users)		26		52	26	26	26
88-95 (87 + N)			106 (N users)		26		52		52	
96-99 (95 + N)			106		-		106 (M users)			
100-103 (99 + N)			106 (2 users)		-		106 (M users)			
104-107 (103 + N)			106 (3 users)		-		106 (M users)			
108-111 (107 + N)			106 (4 users)		-		106 (M users)			
112		52		52		-	52		52	
113	Empty 242-tone RU - No user assigned									
116-127	Reserved									
128-135 (127 + N)			106		26			106 (N users)		
136-143 (135 + N)			106 (2 users)		26			106 (N users)		
144-151 (143 + N)			106 (3 users)		26			106 (N users)		
152-159 (151 + N)			106 (4 users)		26			106 (N users)		
160-167 (159 + N)			106 (5 users)		26			106 (N users)		
168-175 (167 + N)			106 (6 users)		26			106 (N users)		
176-183 (175 + N)			106 (7 users)		26			106 (N users)		
184-191 (183 + N)			106 (8 users)		26			106 (N users)		
192-199 (191 + N)	242 (N users)									

26 tone RU assigned to 1 user as part of a 20 MHz subchannel assignment of 9 26-tone RUs

No users assigned to this RU; no data field transmitted on these subcarriers

The number of users (N) assigned to this 106-tone RU depends on the allocation index and must be 1-8.

The number of users (M) assigned to this 106-tone RU depends on the allocation index and must be 1-4.

The number of users assigned to the upper 106-tone RU depends on the allocation index, but 2 users are always assigned to the lower 106-tone RU

If selected, this 20 MHz subchannel is unused; the subchannel is punctured

RU assigned to 1 user

RU assigned to 1-4/8 users, depending on the allocation index

RU assigned to specified number of users, irrespective of the allocation index

In this example, we focus on generating log-SGN parameters under OFDMA with RU size 106 SISO, MCS4. The allocation index in the full PHY is set to 24. From Table C-1.3, we can see that the 1st RU (the blue RU) has size of 106.

Using the similar procedure of examples 1-3, we can generate the following table:

Table C-1.1. Average PER and Log-SGN parameters under 11ax OFDMA allocation with RU size 106, SU-SISO, **Model-D, MCS4**, with payload length 1000. The parameters are obtained by running 40000 packet simulations. Under such setup, the optimized EESM parameter $\beta = 8.7307$.

Rx SNR	Full PHY Avg PER	Log-SGN Avg PER	μ	σ	λ_1	λ_2
11dB	0.7583	0.7828	1.6230	0.7813	0.7775	1.4878
15dB	0.4227	0.4113	3.1015	0.8930	-1.1420	0
19dB	0.1600	0.1462	3.2718	0.7353	-0.7159	11.8710
23dB	0.0417	0.0474	3.8469	0.8242	-0.6345	7.9055