Υπολογισμός data rate στο στάνταρτ 802.11ac

Ευαισθησία δέκτη, MCS index, Modulation & Coding Rate, Guard Interval and Data Rate (Wireless Link Rate)

802.11 ac								
Minimum Sensitivity (dBm) (20MHz Channel spacing)	Minimum Sensitivity (dBm) (40MHz Channel spacing)	Minimum Sensitivity (dBm) (80MHz Channel spacing)	Minimum Sensitivity (dBm) 80+80MHz Channel spacing)	MCS index	Supported Modulation	Coding Rate (R)	Data Rate (Mb/s) Guard Interval GI=800ns	Data rate (Mb/s) Guard Interval GI=400ns
-82	-79	-76	-73	0	BPSK	1/2	Check 802.11ac-Data Rate Tables or slide 3 for correct combination of Guard Interval, channel bandwidth and spatial streams	
-79	-76	-73	-70	1	QPSK	1/2		
-77	-74	-71	-68	2	QPSK	3/4		
-74	-71	-68	-65	3	16-QAM	1/2		
-70	-67	-64	-61	4	16-QAM	3/4		
-66	-63	-60	-57	5	64-QAM	2/3		
-65	-62	-59	-56	6	64-QAM	3/4		
-64	-61	-58	-55	7	64-QAM	5/6		
-59	-56	-53	-50	8	256-QAM	3/4		
-57	-54	-51	-48	9	256-QAM	5/6		

Data Rate Calculation

MCS	Lowest rates Mbps (20 MHz channel, 1x SS)		Channel width	Spatial streams	Highest rates Mbps (160 MHz channel, 8x SS)	
	Long GI	Short GI			Long GI	Short GI
0	6.5	7.2	x2.1 for 40 MHz x4.5 for 80 MHz x9.0 for 160 MHz	x2 for 2 SS x3 for 3 SS x4 for 4 SS x5 for 5 SS x6 for 6 SS x7 for 7 SS x8 for 8 SS	468.0	520.0
1	13.0	14.4			939.0	1040.0
2	19.5	21.7			1404.0	1560.0
3	26.0	28.9			1872.0	2080.0
4	39.0	43.3			2808.0	3120.0
5	52.0	57.8			3744.0	4160.0
6	58.5	65.0			4212.0	4680.0
7	65.0	72.2			4680.0	5200.0
8	78.0	86.7			5616.0	6240.0
9	(86.7)	(96.3)			6240.0	6933.3

Data rates for various 802.11ac configurations

Data Rates example for a 400ns Guard Interval (Short GI)

MCS	Modula-tion & Rate	20 MHz 1x SS	20 MHz 2x SS	20 MHz 4x SS	20 MHz 8x SS	40 MHz 1x SS	40 MHz 2x SS	40 MHz 4x SS	40 MHz 8x SS	80 MHz 1x SS	80 MHz 2x SS	80 MHz 4x SS	80 MHz 8x SS	160 MHz 1x SS	160 MHz 2x SS	160 MHz 4x SS	160 MHz 8x SS
0	BPSK 1/2	7.2	14.4	28.9	57.8	15.0	30.0	60.0	120.0	32.5	65.0	130.0	260.0	65.0	130.0	260.0	520.0
1	QPSK 1/2	14.4	28.9	57.8	115.6	30.0	60.0	120.0	240.0	65.0	130.0	260.0	520.0	130.0	260.0	520.0	1040.0
2	QPSK 3/4	21.7	43.3	86.7	173.3	45.0	90.0	180.0	360.0	97.5	195.0	390.0	780.0	195.0	390.0	780.0	1560.0
3	16-QAM 1/2	28.9	57.8	115.6	231.1	60.0	120.0	240.0	480.0	130.0	260.0	520.0	1040.0	260.0	520.0	1040.0	2080.0
4	16-QAM 3/4	43.3	86.7	173.3	346.7	90.0	180.0	360.0	720.0	195.0	390.0	780.0	1560.0	390.0	780.0	1560.0	3120.0
5	64-QAM 2/3	57.8	115.6	231.1	462.2	120.0	240.0	480.0	960.0	260.0	520.0	1040.0	2080.0	520.0	1040.0	2080.0	4160.0
6	64-QAM 3/4	65.0	130.0	260.0	520.0	135.0	270.0	540.0	1080.0	292.5	585.0	1170.0	2340.0	585.0	1170.0	2340.0	4680.0
7	64-QAM 5/6	72.2	144.4	288.9	577.8	150.0	300.0	600.0	1200.0	325.0	650.0	1300.0	2600.0	650.0	1300.0	2600.0	5200.0
8	256 QAM 3/4	86.7	173.3	346.7	693.3	180.0	360.0	720.0	1440.0	390.0	780.0	1560.0	3120.0	780.0	1560.0	3120.0	6240.0
9	256-QAM 5/6	–	–	–	–	200.0	400.0	800.0	1600.0	433.3	866.7	1733.3	3466.7	866.7	1733.3	3466.7	6933.3

Selected 802.11ac rates in Mbps (short guard interval, 1, 2, 3, 4, 8 SS)

Υπολογισμός data rate

- 802.11ac supports up to 8 spatial streams and 10 MCS indexes (MCS index 0-9) in contrary to 802.11n that defines 77 MCS indexes (MCS index 0-76).
- To calculate 802.11ac data rate you need to consider
  - the channel spacing / bandwidth in use (20MHz, 40MHz, 80MHz, 80+80=160MHz),
  - the Guard Interval (800ns or 400ns)
  - the number of antennas / spatial streams (up to 8)
  - the received signal level at each antenna from each spatial stream
- With the above information, one can select the theoretical data rate from the 802.11ac data rate tables. Alternatively one can use the table of slide 3 (Long GI = 800ns, Short GI=400ns)
- Note: Minimum sensitivity criterion applies to similar modulation schemes for all entries in the data rate tables