

Proposal for MCS Table

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Target Topic: “Channel coding and HARQ”

Base Contribution:

None

Purpose:

To be discussed and adopted by TGM for 802.16m amendment

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About This Contribution

- Goal and scope of this contribution
 - Propose MCS Table
- Issue to be addressed in this contribution
 - New MCS Table for IEEE 802.16m amendment

MCS in IEEE 802.16e

- Problems of IEEE 802.16e's MCS Table
 - **Irregular Distribution** of required SNRs at target 10% BLER
 - **Coarse granularity** of the required SNRs

MCS Index	Spectral Efficiency	Required SNR [dB] to achieve BLER 10%
0	0.17	-6.57
1	0.25	-4.9065
2	0.50	-2.1347
3	1.00	1.33
4	1.50	4.36
5	2.00	6.66
6	3.00	10.5
7	4.00	14.3
8	4.50	15.76
9	5.00	17.31

New MCS Design for IEEE 802.16m

- Design Criterion
 - Equi-distance of required SNRs
 - Appropriate granularity (More dense than that of IEEE 802.16e)
- SLS Performance Comparison to determine appropriate granularity

Channel	1dB granularity (5bits) (Mbps)	2dB granularity (4bits) (Mbps)	Gains (at 1dB granularity)
Ped_B (3km/h)	6.77	6.75	+0.3%
Ped_B (30km/h)	5.45	5.46	-0.2%
Veh_A (120km/h)	5.44	5.41	+0.6%

- There is no performance difference between 1dB and 2dB granularities

New MCS Design for IEEE 802.16m

- MCS Design Procedures (Range of required SNR **-5 ~ 20dB**)
 - Determine the number of bits for MCS Table
 - 4bits → 1.62 dB granularity
 - 5bits → 0.81 dB granularity
 - **4 bits are chosen by our SLS results**
 - Determine Modulation and Code Rate for each MCS level
 - Among Modulation & Code Rate combinations to achieve the required SNR, it is chosen to get the highest spectral efficiency

New MCS Design for IEEE 802.16m

MCS Table

Index	Modulation	Code Rate
0	QPSK	31/256
1	QPSK	47/256
2	QPSK	70/256
3	QPSK	98/256
4	QPSK	131/256
5	QPSK	166/256
6	QPSK	199/256
7	16QAM	123/256
8	16QAM	149/256
9	16QAM	176/256
10	16QAM	204/256
11	16QAM	229/256
12	64QAM	173/256
13	64QAM	196/256
14	64QAM	218/256
15	64QAM	234/256

Appendix

- Simulation Conditions for SLS
 - Based on the current IEEE 802.16m EMD
 - Number of users per cell : 10
 - Number of allocated users: 3
 - Scheduling: Proportional Fair
 - Cell radius: 1.5km
 - SNR Range for MCS: -10 ~ 20 dB
 - CQI Report Period: 4 Frame (20ms)
 - Asynchronous & Non-adaptive HARQ

Text Proposal to 802.16m amendment

Proposed Text is captured at chapter 15.x.1.1 MCS Table in IEEE C802.16m-09/0300 or its latest version.