Proposal for MCS Table

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Chiwoo Lim, Seunghoon Choi, Songnam Hong, Sung-Eun Park, Jaeweon Cho, Jaehee Cho, Heewon Kang, Hokyu Choi
E-mail: {chiwoo.lim, seunghoon.choi, sn7955.hong, se.park, jaeweon.cho, jaehee1.cho, hkang, choihk} @samsung.com
Samsung Electronics, Co., Ltd.
416 Maetan-3, Suwon, 443-770, Korea

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IEEE 802.16m-08/053r1, “Call for Comments and Contributions on Project 802.16m Amendment Working Document”,
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Base Contribution:

None

Purpose:

To be discussed and adopted by TGm for 802.16m amendment

Notice:

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Proposal for MCS Table

Chiwoo Lim, Seunghoon Choi, Songnam Hong, Sung-Eun Park,
Jaeweon Cho, Jaehee Cho, Heewon Kang, Hokyu Choi

Samsung Electronics Co., Ltd.

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.