

WF on 256QAM CQI table design

**Huawei, HiSilicon, CATR, Panasonic,
III, CATT, Broadcom, Nokia, NSN,
Microsoft, CMCC, CTC, Intel, Ericsson**

Background

- It was agreed in RAN1 #76b for CQI table
 - Switching point of 64QAM and 256QAM should be CQI 15 in the existing table
 - The modulation order of existing CQI 15 is changed to 256QAM
 - Working assumption: down-sample low CQI entries by removing 3 QPSK entries, and add 3 new entries for 256QAM region
 - Revisit if problems if significant issues are found
 - The 3 entries to be removed are either {#1, #3, #5} or {#2, #4, #6}
 - The last 4 entries will be for 256QAM, but the actual SE is FFS
 - Order the CQI indices in the Rel-12 CQI table according to the spectral efficiencies

Observations

- Observations from submitted contributions in RAN1 77 on the open issues for CQI table design
 - Removing 3 existing QPSK entries
 - 11 companies {#2,#4,#6}
 - 5 companies {#1,#3,#5}
 - Spectrum efficiency (SE) for the first 256QAM entry
 - 14(all) companies 5.5547
 - Spectrum efficiency (SE) for the last 256QAM entry
 - 12 companies 7.4063
 - 1 company 7.4375, 1 company 7.3594
 - Spectrum efficiency (SE) for the middle 256QAM entries
 - 5 companies propose equal spectral efficiency interval: 6.1719, 6.7891
 - 10 companies propose equal SINR interval with different values

Proposals

- Confirm the working assumption
 - down-sample low CQI entries by removing 3 QPSK entries, and add 3 new entries for 256QAM region
- The 3 QPSK entries to be removed are existing {#2, #4, #6}
- Spectrum efficiency (SE) for the first 256QAM entry is 5.5547
- Spectrum efficiency (SE) for the last 256QAM entry is 7.4063
- Spectrum efficiency (SE) for the middle 256QAM entries are down-selected between 2 options in RAN1 #77
 - Option1: 6.1719, 6.7891
 - Option2*: 6.2237, 6.9153

*: average value from the results with equal SINR interval between [5,5547, 7.4063]

Proposals

- The Rel-12 CQI table with 256QAM is proposed to be selected between table 1 and table 2 in RAN1 #77 meeting

Table1:

CQI index	CQI index in current table	Modulation in current table	Modulation	Code rate x 1024	Efficiency
0	0		out of range		
1	1	QPSK	QPSK	78	0.1523
2	3	QPSK	QPSK	193	0.3770
3	5	QPSK	QPSK	449	0.8770
4	7	16QAM	16QAM	378	1.4766
5	8	16QAM	16QAM	490	1.9141
6	9	16QAM	16QAM	616	2.4063
7	10	64QAM	64QAM	466	2.7305
8	11	64QAM	64QAM	567	3.3223
9	12	64QAM	64QAM	666	3.9023
10	13	64QAM	64QAM	772	4.5234
11	14	64QAM	64QAM	873	5.1152
12	15	64QAM	256QAM	711	5.5547
13	-		256QAM	790	6.1719
14	-		256QAM	869	6.7891
15	-		256QAM	948	7.4063

Proposals

- Table 2

CQI index	CQI index in current table	Modulation in current table	Modulation	Code rate x 1024	Efficiency
0	0		out of range		
1	1	QPSK	QPSK	78	0.1523
2	3	QPSK	QPSK	193	0.3770
3	5	QPSK	QPSK	449	0.8770
4	7	16QAM	16QAM	378	1.4766
5	8	16QAM	16QAM	490	1.9141
6	9	16QAM	16QAM	616	2.4063
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11	14	64QAM	64QAM	873	5.1152
12	15	64QAM	256QAM	711	5.5547
13	-		256QAM	797	6.2237
14	-		256QAM	885	6.9153
15	-		256QAM	948	7.4063