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(54) **METHOD AND RADIO NODE FOR ENABLING USE OF HIGH ORDER MODULATION IN A RADIO COMMUNICATION WITH A USER EQUIPMENT**

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(71) Applicant: **Telefonaktiebolaget L M Ericsson (publ)**, Stockholm (SE)

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(72) Inventors: **David Hammarwall**, Vallentuna (SE); **Meng Wang**, Solna (SE)

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(73) Assignee: **Telefonaktiebolaget LM Ericsson (publ)**, Stockholm (SE)

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 56 days.

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Primary Examiner — Diane Lo

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(74) Attorney, Agent, or Firm — Coats & Bennett, P.L.L.C.

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(57) **ABSTRACT**

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A method and radio node (500) for enabling higher-order modulation in a radio communication with a first UE (502). A first table configuration comprises at least one of a first Modulation and Coding Scheme, MCS, table and a first Channel Quality Indicator, CQI, table which tables support a certain maximum modulation order. When the radio node (500) detects that a modulation order higher than the maximum modulation order of the first table configuration is potentially possible to use in the radio communication, the radio node (500) instructs the first UE (502) to apply a second table configuration which comprises at least one of a second MCS table and a second CQI table which second tables support the higher modulation order. At least one entry for at least one modulation order in the tables of the first table configuration is maintained in the tables of the second table configuration as a fall-back in case it is desirable to use the at least one modulation order of the first table configuration when the second table configuration is applied. Thereby, a higher data rate can be achieved in the radio communication.

(65) **Prior Publication Data**

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Related U.S. Application Data

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(51) **Int. Cl.**
H04L 1/00 (2006.01)
H04W 72/08 (2009.01)

(52) **U.S. Cl.**
CPC **H04L 1/0005** (2013.01); **H04L 1/0003** (2013.01); **H04L 1/0009** (2013.01);

(Continued)

(58) **Field of Classification Search**

None
See application file for complete search history.

28 Claims, 7 Drawing Sheets

Modulation	Q _m	Bits
0	2	0
1	2	1
2	2	2
3	2	3
4	2	4
5	2	5
6	2	6
7	2	7
8	2	8
9	2	9
10	4	10
11	4	11
12	4	12
13	4	13
14	4	14
15	4	15
16	4	16
17	4	17
18	4	18
19	4	19
20	4	20
21	4	21
22	4	22
23	4	23
24	4	24
25	4	25
26	4	26
27	4	27
28	4	28
29	4	29
30	4	reserved

- (52) **U.S. Cl.**
CPC *H04L1/0011* (2013.01); *H04L 1/0016*
(2013.01); *H04L 1/0025* (2013.01); *H04L*
1/0026 (2013.01); *H04W 72/082* (2013.01)

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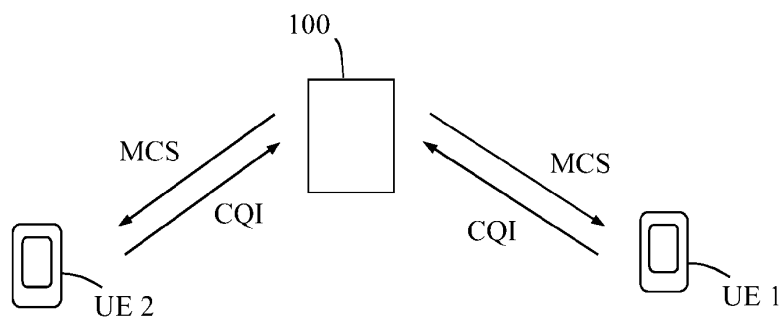


Fig. 1 (Prior art)

MCS Index	Modulation Order	TBS Index
I_{MCS}	Q_m	I_{TBS}
0	2	0
1	2	1
2	2	2
3	2	3
4	2	4
5	2	5
6	2	6
7	2	7
8	2	8
9	2	9
10	4	9
11	4	10
12	4	11
13	4	12
14	4	13
15	4	14
16	4	15
17	6	15
18	6	16
19	6	17
20	6	18
21	6	19
22	6	20
23	6	21
24	6	22
25	6	23
26	6	24
27	6	25
28	6	26
29	2	reserved
30	4	
31	6	

Fig. 2

CQI index	modulation	code rate x 1024	efficiency
0	out of range		
1	QPSK	78	0.1523
2	QPSK	120	0.2344
3	QPSK	193	0.3770
4	QPSK	308	0.6016
5	QPSK	449	0.8770
6	QPSK	602	1.1758
7	16QAM	378	1.4766
8	16QAM	490	1.9141
9	16QAM	616	2.4063
10	64QAM	466	2.7305
11	64QAM	567	3.3223
12	64QAM	666	3.9023
13	64QAM	772	4.5234
14	64QAM	873	5.1152
15	64QAM	948	5.5547

Fig. 3

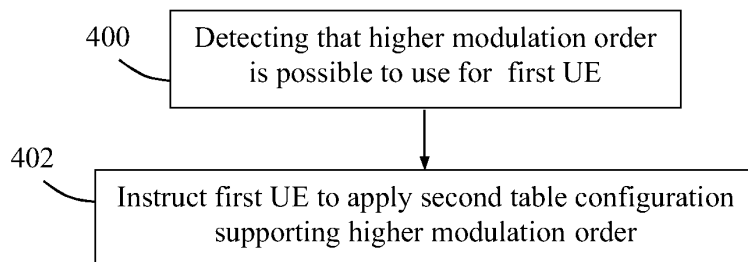


Fig. 4

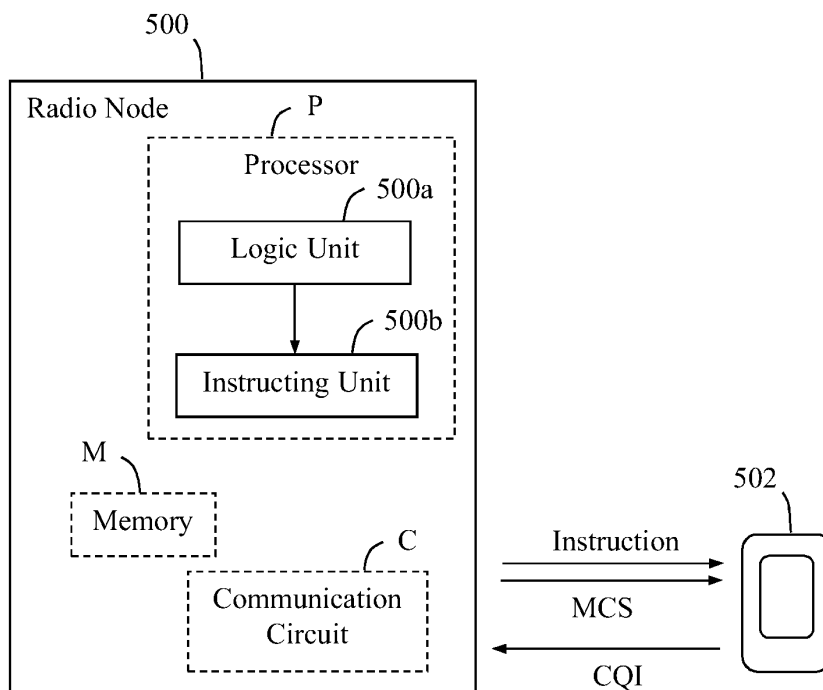


Fig. 5

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