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Datasheet for the decision of 20 September 2024

Case Number: T 0922/22 - 3.5.05

Application Number: 18826179.6

Publication Number: 3522390

IPC: H04B7/06, H04B7/0456, H04L5/00

Language of the proceedings: EN

Title of invention:
Rank indication method, rank indication reporting method, device and system, and storage medium

Applicant:
Huawei Technologies Co., Ltd.

Headword:
Rank indication/HUAWEI

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 12(8), 13(2)

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It can be changed at any time and without notice

Keyword:
Decision in written proceedings - (yes): cancellation of hearing following appellant's announcement of non-attendance
Inventive step - main request (no)
Admittance of claim amendments filed after Art. 15(1) RPBA communication - auxiliary request (no): no "exceptional circumstances"

Decisions cited:
T 2360/17

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Case Number: T 0922/22 - 3.5.05

D E C I S I O N
of Technical Board of Appeal 3.5.05
of 20 September 2024

Appellant: (Applicant)	Huawei Technologies Co., Ltd. Huawei Administration Building Bantian Longgang District Shenzhen, Guangdong 518129 (CN)
Representative:	Gill Jennings & Every LLP The Broadgate Tower 20 Primrose Street London EC2A 2ES (GB)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 21 October 2021 refusing European patent application No. 18826179.6 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	K. Bengi-Akyürek
Members:	J. Eraso Helguera
	F. Bostedt

Summary of Facts and Submissions

I. The appellant lodged an appeal against the decision of the examining division refusing the present European patent application for lack of inventive step (Article 56 EPC) with respect to the claims of a main request and an auxiliary request.

II. The appealed decision referred, *inter alia*, to the following prior-art documents:

D2: NTT Docomo Inc: "Work plan for Rel-15 NR WI", R1-1718177,

D5: Ericsson: "Offline session notes CSI reporting AI 7.2.2.2)", R1-1719142.

III. With its statement of grounds of appeal, the appellant filed a main request and an auxiliary request for the first time in appeal proceedings.

IV. In a communication pursuant to Article 15(1) RPBA, the board stated its negative preliminary opinion on the allowability of the main request and on the admittance into the appeal proceedings of the auxiliary request.

V. In response to that communication, the appellant submitted further arguments and filed a new auxiliary request replacing the previous auxiliary request.

VI. In a further response, the appellant informed the board that it would not be represented at the arranged oral proceedings.

VII. The appellant's final requests were that the decision under appeal be set aside and that a patent be granted on the basis of the claims of either of:

- the **main request** filed with the statement of grounds of appeal and
- the **auxiliary request** filed in response to the board's preliminary opinion.

VIII. The board subsequently cancelled the oral proceedings (see Article 12(8) RPBA).

IX. Claim 1 of the **main request** reads as follows:

"A rank indication reporting method, comprising:

receiving (503), by a terminal device, a rank indication parameter from a network device, wherein the rank indication parameter comprises a rank indication restriction parameter that is used to restrict a rank to be reported by the terminal device; and

determining, by the terminal device, based on a number of ranks whose corresponding bits are set to 1 in ranks whose index numbers are 0, 1, 2, 3, 4, 5, 6, and 7 indicated by the rank indication restriction parameter, a number of bits used for rank indication reporting; and

reporting (504), by using the determined number of bits, an index number of a rank whose corresponding bit is set to 1 in the ranks whose index numbers are 0, 1, 2, 3, 4, 5, 6, and 7;

wherein when the terminal device has not received a channel quality indication number configured by the network device for the terminal device, or when a channel quality indication number that is received by the terminal device and configured by the network device for the terminal device is 1, the terminal

device determines that the number of bits used for rank indication reporting is $N_1=\lceil \log_2 M_1 \rceil$, wherein $N_1 \geq 1$, M_1 is a number of elements in which bits corresponding to ranks whose index numbers are 0, 1, 2, and 3 indicated by the rank indication restriction parameter are set to 1, and N_1 and M_1 are positive integers; and

reports, by using the determined number N_1 of bits, an index number of a rank whose corresponding bit is set to 1 in the ranks whose index numbers are 0, 1, 2, and 3."

Claim 1 of the **auxiliary request** differs from claim 1 of the main request in the deletion of the wording:

"when the terminal device has not received a channel quality indication number configured by the network device for the terminal device, or".

Reasons for the Decision

1. Technical background

1.1 As indicated in the "BACKGROUND" section of the application (paragraphs [0003] to [0005]), a network device sends Downlink Control Information (DCI) to a terminal device to trigger aperiodic Channel State Information (CSI) reporting and/or uplink-data transmission performed by the terminal device. The DCI includes a parameter that indicates the terminal device to perform CSI reporting. CSI reported by the terminal device to the network device usually includes parameters such as a Rank Indication (RI), a precoding matrix indicator (PMI), and a channel quality indication (CQI). A parameter used by the network device to indicate the terminal device to perform CSI

reporting is a Rank Indication restriction ("RI restriction"). The RI restriction parameter is used to indicate, to the terminal device, PMIs and RIs corresponding to ranks ("rank") that are allowed to be reported. Another parameter used by the network device to indicate the terminal device to perform CSI reporting is a CQI number or a CQI maximum number (Num_CQI/Max_Num_CQI). The Num_CQI/Max_Num_CQI parameter is used to indicate a number of CQIs or a maximum number of CQIs that are reported by the terminal device. There is an association relationship between the number of CQIs or the maximum number of CQIs reported by the terminal device and a number of RIs reported by the terminal device. According to the application, the RI restriction indicated by the network device to the terminal device conflicts with the Num_CQI/Max_Num_CQI in some cases, and then the terminal device cannot perform RI reporting.

1.2 In the context of this *subjective* technical problem, paragraph [0061] of the application explains that, for example, when a network device configures that the TypeI-SinglePanel-RI-Restriction = [r7, r6, r5, r4, r3, r2, r1, r0] = [1 0 1 0 0 0 0 0], and does not configure "Num_CQI" or configures that "Num_CQI = 1", based on an indication of the TypeI-SinglePanel-RI-Restriction, an RI less than or equal to 4 cannot be reported; and when the network device does not configure the Num_CQI or configures that Num_CQI = 1, the network device indicates that the terminal device can report only one CQI, namely, a maximum to-be-reported RI is 4, that is, a "rank 4" whose index number is "r3" and whose value is "4". These two indications conflict with each other, and after the terminal device has received the two parameters, it does not know how to report the RI, thereby causing a system bug.

2. MAIN REQUEST

Claim 1 of the main request is identical to claim 1 of the main request on which the appealed decision is based, except for the replacement of the full stop (".") at the end of line 11 by a semicolon (";"). This claim comprises the following limiting features:

A rank indication reporting method, comprising:

(a) receiving, by a terminal device, an RI parameter from a network device, wherein the RI parameter comprises an RI restriction parameter that is used to restrict a rank to be reported by the terminal device;

(b) determining, by the terminal device, based on a number of ranks whose corresponding bits are set to 1 in ranks whose index numbers are 0, 1, 2, 3, 4, 5, 6, and 7 indicated by the RI restriction parameter, a number of bits used for RI reporting;

(c) reporting, by using the determined number of bits, an index number of a rank whose corresponding bit is set to 1 in the ranks whose index numbers are 0, 1, 2, 3, 4, 5, 6, and 7;

(d) when the terminal device has not received a CQI number configured by the network device for the terminal device, or

(e) when a CQI number that is received by the terminal device and configured by the network device for the terminal device is 1, the terminal device

(f) determines that the number of bits used for RI reporting is $N_1=\lceil \log_2 M_1 \rceil$, wherein $N_1 \geq 1$, M_1 is a number of elements in which bits corresponding to ranks whose index numbers are 0, 1, 2, and 3 indicated by the RI restriction parameter are set to 1, and N_1 and M_1 are positive integers;

(g) reports, by using the determined number N_1 of bits, an index number of a rank whose corresponding bit is set to 1 in the ranks whose index numbers are 0, 1, 2, and 3.

2.1 Claim 1 - inventive step starting from D5

2.1.1 Document **D5** also concerns CSI reporting (in LTE). More specifically, D5 discloses a rank indication method in which a terminal device (UE):

(a) receives from a network device (BS) an RI parameter comprising an RI restriction parameter (page 2/2, section 7.2.1.1: "**Alt. 1**: LTE approach for rank restriction using a bitmap of size-8, where bit $i \in 0,...,7$ indicates if rank $r = i+1$ is allowed to be reported"),

(b) determines, based on a number of ranks whose corresponding bits are set to 1 in ranks whose index numbers are 0, 1, 2, 3, 4, 5, 6, and 7 indicated by the RI restriction parameter, a number of bits used for RI reporting (page 4/2, section 2.4,: "The RI bitfield size is $\lceil \log_2 L \rceil$ bits where L is the number of allowed ranks according to RI restriction"),

(c) reports, by using the determined number of bits, an index number of a rank whose corresponding bit is set to 1 in the ranks whose index numbers are 0, 1, 2, 3, 4, 5, 6, and 7 (page 4/2, section 2.4: "RI=0 indicates the lowest allowed rank according to rank restriction signalling"; "RI=1 indicates the second lowest allowed rank according to rank restriction signalling"; "RI=L-1 indicates the largest allowed rank according to rank restriction signalling").

2.1.2 Thus, the board concurs with the examining division and the appellant that **D5** discloses **features (a) to (c)**.

2.1.3 In agreement with the examining division, the appellant formulated the *objective* technical problem associated with these distinguishing features as "how to reduce the signalling overhead caused by the rank indication reporting of the method 'Alt 1' in D5".

2.1.4 In order to avoid any ambiguities, the board will also refer in the following to the "RI restriction parameter" as a *bitmap* with bits having index numbers **r**0 to **r**7, the bit with index number ri corresponding to rank i+1.

index number	r0	r1	r2	r3	r4	r5	r6	r7
rank	1	2	3	4	5	6	7	8

The board observes that, according to the present application, the purported overhead reduction is obtained only in cases where, whenever condition (d) or condition (e) is met and in spite of the presence of bits set to 1 corresponding to ranks with index numbers above r3 in the bitmap defining the "RI restriction parameter", the terminal *only* considers bits set to 1 corresponding to ranks whose index numbers are r0, r1, r2 and r3. This is because, if condition (d) or condition (e) is met, the reported RI is limited to a default maximum value of rank 4, as explained in paragraph [0061] of the application as filed. This rank is lower than the ranks indicated by the bits with index numbers r4 to r7 in the "RI restriction parameter", since these bits correspond to ranks 5 to 8. Under these specific conditions, the alleged advantage is obtained by deliberately ignoring the bits

set to 1 corresponding to ranks with index numbers above r3 in the count used to determine the size of the "bitfield" used for RI reporting.

In contrast to this specific setting, the claimed method generally applies to *any* possible "RI restriction parameters", including those in which all the bits corresponding to ranks with index numbers above r3 are set to 0. For these configurations, the "RI bitfield size" calculated using $\lceil \log_2 L_{0\text{to}3} \rceil$ is exactly the same as using $\lceil \log_2 L_{0\text{to}7} \rceil$. In other words, for them, the method offers no advantage over the "Alt 1" method disclosed in D5, even implying that condition (d) imposes a default maximum rank value of 4. Furthermore, features (f) and (g) do not even require that only bits set to 1 corresponding to ranks with index numbers r0, r1, r2, and r3 be considered.

It follows that the claimed method in its generality does not credibly achieve the alleged technical effect of reducing the signalling overhead.

2.1.5 Consequently, and in view of the presence of conditions (d) and (e), the board considers that the *objective* technical problem is to be framed as "how to adapt the 'Alt 1' method of D5 to the presence of additional rank indication restrictions".

2.1.6 Starting from **D5**, the skilled person would have indeed come across **D2**, which deals with the above problem and discloses at page 71/2 that "NR supports higher layer signalling for the maximum number of CQIs in UCI – Unless indicated otherwise, UE assumes single CQI in UCI, i.e. up to four MIMO layers in RI report", i.e. condition (d). The skilled person would thus have immediately realised that, whatever the values in the

RI restriction bitmap proposed in method "Alt 1", the reported RI should not exceed rank 4. As for the calculation of the RI bitfield size, the use of the "Alt 1" method without any modification would still require a count of the bits set to 1 in at least all the ranks with index numbers 0, 1, 2 and 3, which are those below or equal to the default maximum rank 4 imposed by the use of a single CQI according to features (f) and (g). Thus, the skilled person starting from D5 and considering D2 would readily have introduced features (d), (f) and (g) into the system of D5, thereby compellingly arriving at the subject-matter of claim 1 without the involvement of any inventive skill.

2.1.7 The appellant submitted that the examining division failed to consider what would happen if the network device did not send a CQI number to the terminal device but provided an RI restriction with the rank index numbers 4 to 7 set to 1. This would have failed the "unless otherwise indicated" condition required for the terminal device to arrive at the default setting of "one CQI and four-layer reporting". Not in the least because, in this scenario, the terminal would indeed have been "indicated otherwise". Further, the terminal device would not have followed the default setting in this case because the RI restriction information provided by the network device would have conflicted with the default setting provided in D2. There was no such express or even implicit teaching in D2 that would have suggested a different behaviour of the terminal device in this scenario. Accordingly, taking into account the teaching of D5, if a skilled person had set out to address the above objective technical problem, the skilled person would not have been minded to restrict the calculation of the number of RI reporting

bits to the non-zero bit corresponding to the rank index numbers 0 to 3 in the manner suggested by the examining division without the benefit of the teachings provided in the present application. Thus, hypothetically, even if the skilled person considered combining D5 with D2, the skilled person would still have not arrived at the claimed subject-matter.

2.1.8 The board disagrees. In document D2, the skilled person would have understood that "unless indicated otherwise" in fact refers to indications of the maximum number of CQIs, which do not include the "RI restriction parameter". Besides, the board has explained above that the alleged "restriction" is not actually present in features (f) and (g).

2.2 The main request is thus not allowable under Article 56 EPC.

3. AUXILIARY REQUEST

3.1 Admittance into the appeal proceedings (Article 13(2) RPBA)

3.1.1 The claims of the **auxiliary request** were filed after notification of the board's communication under Article 15(1) RPBA.

3.1.2 Claim 1 of the auxiliary request differs from claim 1 of the main request solely in the deletion of **condition (d)**.

3.1.3 **Conditions (d) and (e)** appeared as *alternatives* ("or") in claim 1 of the main request. In its statement of grounds of appeal, the appellant did not comment on any particular merits of condition (e) over condition (d).

Yet, with the deletion of condition (d), the appellant's inventive-step argumentation prominently depended on the presence of condition (e). According to the appellant, condition (e) *must* be met as the *only* condition for the terminal device to perform method steps (f) and (g). The appellant concluded that this request should be admitted, as it was based on subject-matter previously present in the independent claims and directly responded to the observations made by the board in an attempt to address them.

3.1.4 In the board's view, the deletion of condition (d) constitutes an "amendment" to the appellant's case under Article 13(2) RPBA (see e.g. **T 2360/17**, Reasons 2.4). According to this provision, any amendment to a party's appeal case is not taken into account, unless there are exceptional circumstances, which have been justified with cogent reasons by the party concerned.

3.1.5 The board's negative preliminary opinion on the admittance of the previous auxiliary request, filed for the first time with the statement of grounds of appeal, cannot constitute "exceptional circumstances".

3.1.6 Accordingly, there are no "exceptional circumstances", which have been justified with "cogent reasons" in the present case. Thus, the board decides not to admit the auxiliary request into the appeal proceedings (Article 13(2) RPBA).

4. Since there is no allowable claim request on file, the appeal must be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

B. Brückner K. Bengi-Akyürek

Decision electronically authenticated