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State Intellectual Property Office

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Date of publication:

Application number or patent number: 201610940656.0

Publication number:

Case Number: 4W115263

Invention name: A method and device for UE and base station in a multi-antenna system

Patentee: Aurora Technology Consulting Co., Ltd.

Invalidation petitioner: Huang Yanli

Decision on invalidation request

(No. 561927)

According to Article 46, Paragraph 1 of the Patent Law, the State Intellectual Property Office shall

The request for invalidation has been reviewed and the decision is as follows:

☒ All patent rights are declared invalid.

☐ The patent right is partially declared invalid.

☐ Maintain patent rights.

Pursuant to Article 46, Paragraph 2 of the Patent Law, if you are dissatisfied with this decision, you may file a claim within three months from the date of receipt of this notice.

The case was filed with the Beijing Intellectual Property Court, and the other party participated in the litigation as a third party.

Appendix: The main text of the decision is 15 pages (the main text starts from page 2).

Head of the panel: Wu Lei

Chief judge: Wu Weimin

Counselor: Guo Qiong

Patent Office Reexamination and Invalidation Trial Department

APPLE 1150
Apple v. Apex Beam
IPR2025-00921

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State Intellectual Property Office

Decision on Invalidation Request (No. 561927)

Case Number	No. 4W115263
Decision date	May 09, 2023
Name of invention	A method and device for UE and base station in a multi-antenna system
International Classification Number	H04L 1/00ÿH04L 27/26ÿH04W 16/28
Invalidation Requester	Huang Yanli
Patentee	Aurora Technology Consulting LLC
Patent No	201610940656.0
Application date	November 01, 2016
Authorization announcement date	January 03, 2020
Invalidation request date	November 11, 2022
Legal basis	Article 22, Paragraph 3 of the Patent Law

Decision points:

If the technical solution protected by the claim has distinguishing features compared with the reference document that is the closest prior art, but the difference The features are disclosed in another comparative document, and those skilled in the art can make a conclusion based on the prior art and their ordinary knowledge and ability. There is a motivation to apply the technical means disclosed in another comparative document to the closest prior art to solve the same technical problem as this patent. The technical problem is solved, thereby obtaining the technical solution protected by the claim, and the effect obtained is predictable to those skilled in the art. If the invention is not expected or reasonably anticipated, the claim does not involve an inventive step.

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1. Cause of the Case

This invalidation request examination decision involves patent No. 201610940656.0 and patent name “A UE and a base station for a multi-antenna system”

The invention patent for "method and device" (hereinafter referred to as this patent) is filed on November 1, 2016 and the authorization announcement date is January 2020.

On March 3, the patentee was originally Shanghai Langbo Communication Technology Co., Ltd., and later changed to Jiguang Technology Consulting Co., Ltd.

The claims are as follows:

“1. A method in a user equipment for multi-antenna transmission, comprising the following steps:

-Step A. receiving a first signaling, a second signaling, a first reference signal and a second reference signal;

-Step B. Sending first channel information;

The first reference signal includes Q1 RS ports, and the Q1 RS ports are respectively sent by Q1 antenna ports; the second

The reference signal includes Q2 RS ports, and the Q2 RS ports are respectively sent by Q2 antenna ports; the first signaling is used to determine L1

antenna ports, the Q1 antenna ports are a subset of the L1 antenna ports; the second signaling is used to determine the Q2 antenna ports

wherein Q1 and Q2 are positive integers, and L1 is a positive integer greater than or equal to Q1; the first channel information

For Q antenna ports; the Q antenna ports are composed of the Q1 antenna ports and the Q2 antenna ports, and the Q is equal to the

The sum of Q1 and Q2.

2. The method according to claim 1, characterized in that the step B further comprises the following steps:

-Step B0. Sending the first information;

The first information indicates Q3 antenna ports from the L1 antenna ports; Q3 is a positive number less than or equal to L1.

Integer.

3. The method according to claim 1 or 2, characterized in that step A further comprises the following steps:

-Step A0. receiving second information;

The second information indicates the Q1 antenna ports from the L1 antenna ports.

4. The method according to claim 1 or 2, characterized in that the position of the Q1 antenna ports among the Q antenna ports is

Default is set.

5. The method according to claim 1 or 2, characterized in that the beamforming vectors corresponding to the Q1 antenna ports are used to determine the

The beamforming vector corresponding to the transmitting antenna port of the second signaling.

6. The method according to claim 1 or 2, characterized in that the step A further comprises the following steps:

-Step A1. Receive a first wireless signal;

The first channel information is used to generate the first wireless signal.

7. A method in a base station for multi-antenna transmission, comprising the following steps:

-Step A. Sending a first signaling, a second signaling, a first reference signal and a second reference signal;

-Step B. receiving first channel information;

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The first reference signal includes Q1 RS ports, and the Q1 RS ports are respectively sent by Q1 antenna ports; the second

The reference signal includes Q2 RS ports, and the Q2 RS ports are respectively sent by Q2 antenna ports; the first signaling is used to determine L1

antenna ports, the Q1 antenna ports are a subset of the L1 antenna ports; the second signaling is used to determine the Q2 antenna ports

wherein Q1 and Q2 are positive integers, and L1 is a positive integer greater than or equal to Q1; the first channel information

For Q antenna ports; the Q antenna ports are composed of the Q1 antenna ports and the Q2 antenna ports, and the Q is equal to the

The sum of Q1 and Q2.

8. The method according to claim 7, characterized in that said step B further comprises the following steps:

-Step B0. receiving first information;

The first information indicates Q3 antenna ports from the L1 antenna ports; Q3 is a positive number less than or equal to L1.

Integer.

9. The method according to claim 7 or 8, characterized in that step A further comprises the following steps:

-Step A0. Sending the second information;

The second information indicates the Q1 antenna ports from the L1 antenna ports.

10. The method according to claim 7 or 8, characterized in that the positions of the Q1 antenna ports among the Q antenna ports are

Default is set.

11. The method according to claim 7 or 8, characterized in that the beamforming vectors corresponding to the Q1 antenna ports are used to determine

The beamforming vector corresponding to the transmitting antenna port of the second signaling.

12. The method according to claim 7 or 8, characterized in that said step A further comprises the following steps:

-Step A1. Sending a first wireless signal;

The first channel information is used to generate the first wireless signal.

13. A user equipment for multi-antenna transmission, comprising the following modules:

A first receiving module: used for receiving a first signaling, a second signaling, a first reference signal and a second reference signal;

A first sending module: used for sending first channel information;

The first reference signal includes Q1 RS ports, and the Q1 RS ports are respectively sent by Q1 antenna ports; the second

The reference signal includes Q2 RS ports, and the Q2 RS ports are respectively sent by Q2 antenna ports; the first signaling is used to determine L1

antenna ports, the Q1 antenna ports are a subset of the L1 antenna ports; the second signaling is used to determine the Q2 antenna ports

wherein Q1 and Q2 are positive integers, and L1 is a positive integer greater than or equal to Q1; the first channel information

For Q antenna ports; the Q antenna ports are composed of the Q1 antenna ports and the Q2 antenna ports, and the Q is equal to the

The sum of Q1 and Q2.

14. The user equipment according to claim 13, characterized in that the first sending module is also used to send the first information;

The first information indicates Q3 antenna ports from the L1 antenna ports; the Q3 is a positive integer less than or equal to the L1.

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15. The user equipment according to claim 13 or 14. characterized in that the first receiving module is also used to receive second information: wherein.

The second information indicates the Q1 antenna ports from among the L1 antenna ports.

16. The user equipment according to claim 13 or 14, wherein the Q1 antenna ports are

The position is determined by default.

17. The user equipment according to claim 13 or 14, characterized in that the beamforming vectors corresponding to the Q1 antenna ports are used

To determine the beamforming vector corresponding to the transmitting antenna port of the second signaling.

18. The user equipment according to claim 13 or 14, characterized in that the first receiving module is further used to receive a first wireless signal;

The first channel information is used to generate the first wireless signal.

19. A base station device for multi-antenna transmission, comprising the following modules:

A second sending module: used to send a first signaling, a second signaling, a first reference signal and a second reference signal;

The second receiving module is used to receive the first channel information;

The first reference signal includes Q1 RS ports, and the Q1 RS ports are respectively sent by Q1 antenna ports; the second

The reference signal includes Q2 RS ports, and the Q2 RS ports are respectively sent by Q2 antenna ports; the first signaling is used to determine L1

antenna ports, the Q1 antenna ports are a subset of the L1 antenna ports; the second signaling is used to determine the Q2 antenna ports

wherein Q1 and Q2 are positive integers, and L1 is a positive integer greater than or equal to Q1; the first channel information

For Q antenna ports; the Q antenna ports are composed of the Q1 antenna ports and the Q2 antenna ports, and the Q is equal to the

The sum of Q1 and Q2.

20. The base station device according to claim 19, characterized in that the second receiving module is also used to receive the first information;

The first information indicates Q3 antenna ports from the L1 antenna ports; the Q3 is a positive integer less than or equal to the L1.

21. The base station device according to claim 19 or 20, characterized in that the second sending module is also used to send second information; wherein,

The second information indicates the Q1 antenna ports from among the L1 antenna ports.

22. The base station device according to claim 19 or 20, characterized in that the Q1 antenna ports are

The position is determined by default.

23. The base station device according to claim 19 or 20, characterized in that the beamforming vectors corresponding to the Q1 antenna ports are used

To determine the beamforming vector corresponding to the transmitting antenna port of the second signaling.

24. The base station device according to claim 19 or 20, characterized in that the second sending module is also used to send the first wireless signal;

The first channel information is used to generate the first wireless signal.

Regarding the above-mentioned patent rights, Huang Yanli (hereinafter referred to as the applicant) filed a request for invalidation with the National Intellectual Property Administration on November 11, 2022.

The applicant requested that all claims 1-24 of this patent be declared invalid, and submitted the patent authorization announcement text CN108023616B.

The grounds for invalidity are: (1) Claims 1-24 lack essential technical features and do not comply with the provisions of Article 20, Paragraph 2 of the Patent Law; (2) Claims 1-24 lack essential technical features and do not comply with the provisions of Article 20, Paragraph 2 of the Patent Law;

It is not supported by the description and does not comply with Article 26, Paragraph 4 of the Patent Law; (3) the scope of protection of claims 1-24 is unclear and does not comply with the provisions of the Patent Law.

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The provisions of Article 26, paragraph 4 of the Patent Law: (4) The disclosure of this patent specification is insufficient and does not comply with the provisions of Article 26, paragraph 3 of the Patent Law.

After passing the formal review, the National Intellectual Property Administration accepted the above-mentioned invalidation request on November 30, 2022, and sent the invalidation request and

The text of this patent authorization announcement is forwarded to the patent owner, requiring him to reply within the specified time limit. At the same time, a collegial group will be established to review this case.

The petitioner submitted a statement of opinion and the following attachments on December 9, 2022:

Appendix 1: Patent authorization announcement text CN108023616B;

Appendix 2 (hereinafter referred to as Reference Document 1): Chinese invention patent application CN105075322A, published on November 18, 2015;

Appendix 3 (hereinafter referred to as Reference Document 2): Chinese invention patent application CN103918195A, published on July 9, 2014;

Appendix 4 (hereinafter referred to as comparative document 3): US invention patent application US2016/0212643A1 and its Chinese translation, published on July 2016

21st;

Appendix 5 (hereinafter referred to as Reference Document 4): Chinese invention patent application CN102056220A, published on May 11, 2011;

Appendix 6 (hereinafter referred to as Reference Document 5): Chinese invention patent application CN104202073A, published on December 10, 2014;

Appendix 7 (hereinafter referred to as Reference Document 6): Chinese invention patent application CN102412889A, published on April 11, 2012;

Appendix 8 (hereinafter referred to as Reference Document 7): Chinese invention patent application CN104184537A, published on December 3, 2014;

Annex 9 (hereinafter referred to as Reference Document 8): 3GPP TSG RAN WG1 87th meeting proposal R1-1612493 and its Chinese translation, requesting

The person claimed that the date of publication was November 4, 2016.

The grounds for invalidation raised by the applicant are: (1) the patent specification is insufficiently disclosed and does not comply with the provisions of Article 26, Paragraph 3 of the Patent Law; (2)

Claims 1-24 are not supported by the description and do not comply with Article 26, Paragraph 4 of the Patent Law; (3) Claims 1-24 lack necessary technical

The patent does not conform to the provisions of Article 20, Paragraph 2 of the Implementing Regulations of the Patent Law; (4) the protection scope of claims 1-24 is unclear and does not conform to the provisions of the Patent Law.

Article 26, paragraph 4; (5) with respect to prior art 1/ prior art 2/ prior art 3, claims 1, 2, 6-8, 12-14,

18-20, 24 do not possess novelty and do not comply with the provisions of Article 22, Paragraph 2 of the Patent Law; (6)

3 As the closest prior art, combined with other comparative documents or common knowledge in the field, claims 1-24 do not have inventiveness and do not meet the requirements of

The provisions of Article 22, paragraph 3 of the Patent Law.

The panel issued a notice of forwarding documents on December 15, 2022, forwarding the petitioner's statement of opinion and

The attachments shall be forwarded to the patent owner.

In response to the applicant's request for invalidation, the patent owner submitted a statement of opinion on December 30, 2022, arguing that the patent complies with the Patent Law.

According to the relevant provisions of the Implementing Rules of the Patent Law, the invalidation reasons raised by the applicant are not valid.

The panel sent a document transfer notice to the applicant on January 9, 2023, forwarding the patent owner's opinion submitted on December 30, 2022 to the applicant.

See statement forwarded to petitioner.

In response to the petitioner's statement of opinion filed on December 9, 2022, the patent owner filed a statement of opinion on January 16, 2023.

The patent is believed to comply with the relevant provisions of the Patent Law and the Patent Law Implementing Regulations, and the invalidation reasons raised by the applicant are not established; and the comparative documents 3 and

The Chinese translation of comparative document 8 raised objections to some of its contents.

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The collegial panel sent a notice of oral hearing to both parties on February 22, 2023, and the oral hearing is scheduled to be held on April 13, 2023.

reason.

The patent owner resubmitted the statement of opinion submitted on January 16, 2023 on March 16, 2023.

The collegial panel sent a document transfer notice to the applicant on March 22, 2023, forwarding the patent owner's opinion submitted on March 16, 2023 to the applicant.

See statement forwarded to petitioner.

The oral hearing was held as scheduled. Both parties attended the oral hearing. The following matters were clarified during the oral hearing:

1. Both parties have no objection to the change of the panel members, and have no objection to the identity and qualifications of the other party's appearance in court.

Discuss.

2. The applicant specifies that the grounds and scope of its invalidation shall be based on the statement of opinion submitted on December 9, 2022, and waives the opinion in the invalidation request.

The court gave up the use of comparative document 0 and recognized the partial translation objection of comparative document 3 submitted by the patent owner. The following common knowledge evidence was submitted in court:

Common knowledge evidence 1: Cover, copyright page, translator's preface, foreword, pages 207-210 of "3G Evolution HSPA and LTE (2nd Edition)",

Copy of the back cover page, translated by Du Jiuhui, Miao Qingyu, Xu Bin, etc., Posts and Telecommunications Press, first printing in April 2010;

Common knowledge evidence 2: Cover, title page, copyright page, translator's preface, pages 508-509 of the MIMO Wireless Network Handbook (Original Book 2nd Edition)

Page photocopy, translated by Xu Fangmin, Zheng Changliang, Qiu Haijie, etc., Machinery Industry Press, 1st edition, 1st printing, November 2015;

Common knowledge evidence 3: Copy of the cover, copyright page, preface, introduction, and pages 32-37 of "5G Key Technologies and System Evolution", by Chen Peng

ed., Machinery Industry Press, 1st edition, 1st printing, January 2016;

Common knowledge evidence 4: Photocopy of the cover, copyright page, and pages 56-57 of "Principles and Maintenance of the Fourth Generation Mobile Communication Network", Liang Dehou and Zhang

Edited by Liu Zhaoyu, Beijing University of Posts and Telecommunications Press, 1st edition, 1st printing, October 2016.

3. The patent owner stated that the statement of opinion submitted on January 16, 2023 shall prevail, and the statement of opinion submitted on December 30, 2022 shall be waived.

There is no objection to the authenticity and disclosure time of all evidence submitted by the applicant.

No objection to the time, recognized the common knowledge evidence 4, but believed that the content introduction or summary of the common knowledge evidence 1-3 can be used as

It is a reference book or book for reference purposes and does not mention that it can be used as a teaching material. Therefore, it cannot be used as evidence of common knowledge.

4. During the oral proceedings, both parties fully expressed their opinions on the basis of adhering to their written opinions.

At this point, the collegial panel believes that the facts of the case are clear and a review decision can be made.

II. Reasons for the decision

1. Review Basis

The patentee did not modify the claims during the invalidation stage. The examination text of this invalidation request is the patent grant document.

Claims 1-24 of the patent announcement.

(II) Evidence identification

Comparative Documents 1 and 4 are Chinese patent documents. The patent owner has no right to verify the authenticity and publication time of Comparative Documents 1 and 4.

No objection was raised by the collegial panel. After verification, the panel approved that the publication dates of reference documents 1 and 4 were earlier than the date of the present patent application and could be used as the basis for the evaluation.

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The price of this patent is the use of prior art that is creative.

Regarding the common knowledge evidence 1 submitted by the applicant, the collegial panel has verified that the content of the evidence, "3G Evolution HSPA and LTE (2nd Edition)", is

The last paragraph of the abstract states that "This book is an essential reference guide for personnel in the mobile communications industry and a rare resource for teachers and students in related majors in colleges and universities."

Teaching Reference Book" was printed in April 2010, earlier than the application date of this patent. Therefore, the panel recognized that this book is a common knowledge in this case.

Identification evidence.

(III) Article 22, Paragraph 3 of the Patent Law

Article 22, Paragraph 3 of the Patent Law stipulates: Creativity means that the invention has outstanding substantive features and significant progress compared with the existing technology.

The utility model has substantial features and progress.

1. Claim 1 claims a method in a user equipment for multi-antenna transmission. Reference document 1 discloses a method in an antenna array.

Method and device for obtaining channel state information (see the full text of the specification, claims and drawings of comparative document 1):

[0012] In an antenna array including multiple physical antennas (e.g., massive multiple-input multiple-output (MIMO)), it is possible to efficiently acquire each

Channel state information of the physical antenna.

[0033] The terminal is allocated two different CSI measurement subframe sets from a higher layer to send to the base station for each CSI measurement subframe

Different feedback information.

[0055] As a RS specially designed for CSI measurement and feedback, CSI-RS still has lower RS overhead than CRS and CRS is designed

To support up to 4 multiple antenna ports, CSI-RS is designed to support 8 multiple antenna ports.

The CRS is used so that all terminals in the cell can be used for measurement and demodulation, and thus the CRS is a cell-specific reference signal.

[0111] In most cellular systems including LTE systems, a terminal receives a reference signal for channel estimation from a base station to determine the channel state.

The determined CSI can be reported to the base station. The base station sends a data signal based on the CSI information fed back from the terminal.

In the system, the CSI information fed back by the terminal may include channel quality information (CQI), precoding matrix index (PMI) and rank indicator (RI).

[0123] The embodiment of the present invention discloses a method for sending a reference signal for channel estimation and a channel reporting method.

The use of massive multiple-input multiple-output (MIMO) transmission technology.

[0126] For this purpose, multiple terminal-specific CSI-RS in the existing transmission mode 10 are operated, however, like coordinated multi-point (CoMP), it is necessary

Supports transmission of CSI-RS that are not sent from different base stations (i.e., CSI-RS at different antenna ports in one base station). The terminal can perform

The CSI feedback of the CSI-RS corresponding to different antenna ports received by the antenna array (equivalent to a method in a user equipment for multi-antenna transmission)

Law).

[0132] For example, in a full antenna transmission scheme, multiple reference signals (e.g., CSI-RS) are sent at the same time to allow the terminal to immediately know the

The channel information about all physical antennas included in the antenna array. In the case of CSI-RS transmitted in the corresponding physical antenna,

The CSI-RS at different antenna ports in the corresponding physical antenna can be configured and sent. The CSI-RS can be configured based on, for example, a configured period and a configured transmission frame offset.

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The information of the shift is used to synchronize the time when the physical antenna sends the reference signal. Antenna ports can be used to distinguish between different resources.

The CSI-RS defined in the source.

[0145] When using such a method, the terminal can receive signals from four physical antennas 900, 905, 910 and 911 included in a vertical antenna set.

915 receives CSI-RS defined at four antenna ports and transmits the CSI-RS from four physical antennas 950, 955, 960 included in a horizontal antenna set.

and 965 receive CSI-RS defined at 4 antenna ports.

[0147] FIG. 10 is a conceptual diagram illustrating a virtualized antenna transmission scheme according to an embodiment of the present invention.

Referring to FIG. 10 , the base station may use a virtualized antenna transmission scheme as a method for allowing the terminal to know the inaccurate and restrictive but

It is a method for obtaining channel information about all antennas.

In the virtualized antenna transmission scheme, reference signals may be sent to two antenna sets that may be spatially divided, respectively.

Some physical antennas can be used to represent the vertical antenna set and some physical antennas can be used to represent the horizontal antenna set.

The information (eg, precoding weight value) obtained from one of the physical antenna sets is applied to the transmission of the CSI-RS based on another physical antenna.

The terminal may be based on a reference signal (the reference signal is based on information obtained in one of the horizontal antenna set and the vertical antenna set (for example

For example, the precoding weight value) sent) determines the channel state information that will be fed back to the base station.

[0151] Referring to the right side of FIG. 10, four vertical antennas may be assigned to each of the horizontal antenna sets.

The CSI-RS defined at the second antenna port is sent to the four vertical physical antennas included in the first horizontal antenna set 1050.

The CSI-RS defined in the second horizontal antenna set 1055 is sent to the four vertical physical antennas included in the second horizontal antenna set 1055, and the CSI-RS defined at the third antenna port can be

The CSI-RS is sent to the four vertical physical antennas included in the third horizontal antenna set 1060, and the CSI-RS defined at the fourth antenna port may be

The CSI-RS of the horizontal antenna set 1065 is sent to the four vertical physical antennas included in the fourth horizontal antenna set 1065. That is, when the reference signal is transmitted relative to the horizontal antenna set,

When a reference signal is allocated to a physical antenna included in a horizontal antenna set, a reference signal defined at one antenna port may be transmitted.

[0158] In addition, according to an embodiment of the present invention, CSI feedback for an antenna array may be performed by extending the CSI process.

The process supports the allocation and CSI reporting of multiple CSI-RSs per cell when multiple cells transmit data to a terminal (like CoMP).

The process information can be sent through the Radio Resource Control (RRC) and includes non-zero power (NZP) CSI-RS configuration information, interference measurement (IM)

CSI-RS configuration information, CSI report configuration information, etc. For example, the terminal can receive a maximum of 4 CSI processes and a maximum of 3 NZP CSI-RSs.

[0159] In the existing case, although a plurality of CSI processes are configured, the corresponding CSI processes are independently configured, and as a result,

CSI-RS transmission and CSI reporting can be implemented separately. However, in massive MIMO systems, multiple CSIs may be requested for multiple antennas.

Therefore, in a massive MIMO system, a relationship can be formed between CSI processes. That is, in a specific CSI process,

The CSI is estimated using channel information estimated based on various CSI processes and the estimated CSI can be reported.

The CSI reference resource of the reported CSI process may not be the resource configured in the relevant CSI process.

Multiple CSI processes can be supported by using the CSI reference resources of another CSI process. When performing operations for each process, the terminal can obtain the CSI reference resources of the CSI process through higher layer information.

For example, the terminal may receive reference CSI process information from a higher layer and refer to the reference CSI process information.

The CSI process may be another CSI process that is referenced to report, based on one CSI process, channel state information acquired based on a plurality of CSI processes.

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[0162] In FIG. 12, the physical antennas included in the 4×4 antenna array are configured as 4 vertical antenna sets and in the corresponding antenna sets

According to an embodiment of the present invention, CSI-RS can be sent in four vertical antenna sets (a first vertical antenna set, a second vertical antenna set,

The first CSI process 1210 to the fourth CSI process 1240 are respectively performed in the third vertical antenna set and the fourth vertical antenna set, but in one CSI

In a process (eg, the fourth CSI process 1240 executed last), the terminal may store the channel states of the physical antennas included in the 4×4 antenna array.

That is, it is not reported in the first CSI process 1210 to the third CSI process 1230, and is only reported in the fourth CSI process 1240.

The channel state information measured by the first CSI process 1210 to the third CSI process 1230 and the channel state information measured by the fourth CSI process 1240 may be fed back.

The measured channel state information includes channel state information of physical antennas in the 4×4 antenna array.

[0165] Except for a specific CSI process (eg, the fourth CSI process 1240), the terminal performs channel estimation through the received reference signal.

However, it is not necessary to report CSI to the base station. Instead, a specific CSI process (eg, the fourth CSI process 1240) may include a method for reporting CSI information transmitted through all

The CSI information of the channel information estimation of the antenna (equivalent to sending the first channel information). For this purpose, the channel state information of the antenna array is reported

The CSI process information of a CSI process may include information indicating that the CSI is reported by referring to CSI-RS information of another CSI process.

[0166] For example, the CSI process information transmitted from the RRC may include information about other CSI processes associated with a specific CSI process.

In the above embodiment. the configuration information of the fourth CSI process may include identifier information of the first to third CSI processes. wherein the first to third CSI processes

The remaining CSI processes for reporting channel state information may be associated with the CSI process for reporting channel state information.

When the remaining CSI processes can be represented by 8-bit bitmap information, the CSI process information is based on the 8 antenna ends.

The CSI-RS defined at the interface is associated with a maximum of 64 antennas.

[0167] In addition, the NZP CSI-RS configuration information included in each CSI process may include antenna port information of the CSI-RS and information about the

The information about the relationship between the physical antennas in which the CSI defined at a specific antenna port is transmitted.

When there is no relationship information between the physical antenna of the CSI defined at a specific antenna port, when receiving the NZP included in each CSI process

When the CSI-RS is transmitted, the terminal may only know the antenna port information of the CSI-RS, and does not know from which the NZP CSI-RS is sent.

As a result, ambiguity eventually occurs when coupling channel information. Therefore, each NZP CSI-RS configuration information may include information about the antenna array.

The mapping relationship between the physical antennas and CSI-RS antenna ports in the .

[0170] Referring to FIG. 13, the CSI-RS antenna port and the physical antenna included in the antenna array may be represented by using bitmap information 1300.

Relationship information 1350 between them.

[0171] In addition, the information about the antennas included in the antenna array and the CSI-RS antenna ports may be expressed by a matrix instead of a bitmap.

For example, the index of the physical antenna included in the antenna array and the predefined index relative to the CSI-RS antenna can be obtained.

The various forms of the defined matrices are indicated by the indexes, and as a result, the defined matrices can be implemented so that both the terminal and the base station

Since the indices of the physical antennas included in the antenna array and the predefined matrices relative to the CSI-RS antenna ports can be used

The form and configuration method of the physical antenna can be very diverse. The terminal receives the signal of the physical antenna included in the antenna array from the base station.

The base station and the terminal can adaptively share information about the matrix.

Information.

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Claim 1. A method for transmitting channel state information by a terminal. the method comprising:

The terminal receives, from a base station, relationship information related to a CSI-RS and a physical antenna, wherein the relationship information includes information about a first CSI-RS and a transmitting information about a first physical antenna for transmitting the first CSI-RS and information about a second CSI-RS and a second physical antenna for transmitting the second CSI-RS information; and

The terminal sends the first channel state information and the second channel state information to the base station based on the relationship information,

The first physical antenna and the second physical antenna are included in an antenna array,

The first channel state information is related to the signal between the terminal and the first physical antenna determined based on the first CSI-RS. The second channel state information is information related to the terminal and the second channel state information determined based on the second CSI-RS. Information related to the channel status between physical antennas.

Claim 2. The method according to claim 1, wherein the relationship information includes a physical The bitmap information generated by the number of antennas.

The method according to claim 1, wherein the first channel state information and the first The first channel state information and the second channel state information are configured to report the first channel state information and the second channel state information to the terminal. Two CSI processes for channel state information. "

Regarding the feature comparison between the solution protected by claim 1 and comparative document 1, the patentee believes that comparative document 1 does not disclose the RS end The corresponding relationship between the RS port and the antenna port is not disclosed, and the technical relationship between the RS port and the antenna port is not disclosed. The technical features are not disclosed by the comparative document 1, so the comparative document 1 does not disclose the following features in claim 1: "Step A. Receive a first signaling, second signaling, a first reference signal and a second reference signal; wherein the first reference signal includes Q1 RS ports, the Q1 RS ports The second reference signal includes Q2 RS ports, and the Q2 RS ports are respectively sent by Q2 antenna ports. The first signaling is used to determine L1 antenna ports, and the Q1 antenna ports are a subset of the L1 antenna ports; the The second signaling is used to determine the Q2 antenna ports; wherein Q1 and Q2 are positive integers, and L1 is greater than or equal to a positive integer corresponding to the Q1; the first channel information is for Q antenna ports; the Q antenna ports are composed of the Q1 antenna port and the The Q2 antenna ports are composed of Q1 and Q2.

In this regard, the panel believes that: First, regarding the RS port and antenna port, this patent specification only gives an exemplary description, such as "Q1 RS port sends to Q1 antenna port respectively, Q2 RS port sends to Q2 antenna port respectively" and "as a real In this embodiment, the antenna port is formed by superimposing multiple antennas through antenna virtualization, and the mapping coefficients of the multiple antennas to the antenna port form a beam The relevant contents of the "type vector" (see paragraphs 0009 and 0095 of this patent specification) do not have any other more specific limitations; at the same time, the present invention According to the common technical knowledge, a person skilled in the art can know that, according to the 3GPP definition, an antenna port is defined as a signal that can be transmitted from it. The channel of another symbol on the same antenna port infers the channel of the symbol transmitted on the antenna port, that is, the antenna port is a logical The concept does not refer to a specific physical antenna. The antenna port can be defined by a reference signal specific to the antenna port (see the commonly known common Identification Evidence 1 Page 209), so it can also represent RS ports; the mapping of antenna ports to physical antennas is formed by antenna virtualization, and the antenna virtual

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The simulated mapping coefficients constitute the beamforming vector. Therefore, according to the above common knowledge evidence combined with the above content of the specification of comparative document 1,

For example, in paragraph [0132] of the specification of Reference Document 1, Reference Document 1 discloses antenna ports and “at different antenna ports in the corresponding physical antenna”.

The CSI-RS defined in different resources can be configured and sent, and the antenna port can be used to distinguish the CSI-RS defined in different resources.

The antenna port that sends CSI-RS (reference signal) and is used to distinguish CSI-RS (reference signal) defined in different resources can also be called RS port.

port (i.e., the reference signal port).

Secondly, paragraph [0158] of the specification of the comparative document 1 discloses sending NZP CSI-RS configuration information via RRC, and paragraph [0167] of the specification of the comparative document 1 discloses sending NZP CSI-RS configuration information via RRC.

The section discloses that each NZP CSI-RS configuration information may include antenna port information of the CSI-RS and information about the physical antennas and

The mapping relationship between CSI-RS antenna ports is disclosed in paragraph [0170] of the specification of reference document 1, which is used to indicate the mapping relationship between antenna ports and objects.

The relationship information includes information about the relationship between the first CSI-RS and the first antenna port for transmitting the first CSI-RS.

The antenna port information includes or reflects the relationship between the second CSI-RS and the second antenna port for transmitting the second CSI-RS.

The configuration information is equivalent to the first signaling, the second signaling, and the first signaling is used to determine the number of L1 antenna ports.

port, the second signaling is used to determine the Q2 antenna ports; Paragraph [0167] of the specification of Comparative Document 1 discloses that in receiving, including in each

When the NZP CSI-RS in the CSI process, the terminal may only know the antenna port information of the CSI-RS. In conjunction with the specification of reference document 1 [0165]-[0166]

From the content of the segment, we can know that in each CSI process, the terminal receives its own reference signal and configuration information, so the two CSI reception processes receive

The received RS signal is equivalent to the first reference signal and the second reference signal; thus, it can be seen that the comparative document 1 discloses “step A. receiving the first signaling,

second signaling, a first reference signal and a second reference signal" and "the first signaling is used to determine L1 antenna ports, and the second signaling is used

for determining the Q2 antenna ports".

Again, paragraph [0145] of the specification of comparative document 1 discloses that each of the four antenna ports has a CSI-RS defined, and paragraph [0165] discloses multiple CSI

The reference signal can be received separately during the process. Paragraph [0167] of the specification of Comparative Document 1 discloses that during the process of receiving each CSI, the terminal can only know

The antenna port information of CSI-RS, that is, each CSI-RS sends the corresponding reference signal through its corresponding antenna port. The antenna port information package

The invention includes or embodies the information of the number of antenna ports, and thus discloses that "the first reference signal includes Q1 RS ports, and the Q1 RS ports are respectively

The second reference signal includes Q2 RS ports, and the Q2 RS ports are respectively sent by Q2 antenna ports.

Send; wherein said Q1 and said Q2 are positive integers, and said L1 is a positive integer equal to said Q1"; Reference document 1 Specification No. [0162]

The paragraph discloses that when four CSI processes are configured, no reporting may be performed in the first CSI process 1210 to the third CSI process 1230, and

Only in the fourth CSI process 1240. the channel state information measured through the first CSI process 1210 to the third CSI process 1230 and

The channel state information measured by the fourth CSI process 1240 includes the channel state information of the physical antennas in the 4×4 antenna array.

Item 1 The specification [0165] paragraph discloses that reference signals can be received separately in multiple CSI processes but not reported to the base station, but in the fourth CSI process

Report the channel state information obtained through the channel information of all antennas, that is, the above content of the comparative document 1 discloses the feedback information through four CSI processes.

In the case of channel state information, claim 3 of comparative document 1 defines that the first channel state information and the first channel state information are sent based on a CSI process.

Two channel state information, that is, the channel state information is fed back through two CSI processes, and the two CSI processes receive the corresponding antennas respectively.

The reference information of the port is finally fed back through a CSI process. Therefore, the comparative document 1 discloses that “the first channel information is for

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For Q antenna ports; the Q antenna ports are composed of the Q1 antenna ports and the Q2 antenna ports, and the Q is equal to the Q1

and the sum of Q2".

Therefore, the technical solution protected by claim 1 is different from the content disclosed in reference document 1 in that:

The antenna port is a subset of the L1 antenna ports; the L1 is a positive integer greater than the Q1. The technical effect obtained based on the above distinguishing features is

As a result, it is determined that the technical problem actually solved by claim 1 is: how to select some antenna ports for feeding back channel status.

Regarding the above-mentioned distinguishing features, comparative document 4 discloses a method and device for realizing channel measurement, which specifically discloses the following contents (see

(Compared to Document 4 (Full text of the specification and drawings):

"[0013] A user device comprising:

a notification receiving unit, configured to receive a notification sent by a base station and obtain a subset of antenna ports that need to be measured;

The port subset is determined by the base station according to the current state information of the user equipment;

[0015] A measurement feedback unit is used to perform channel measurement on the antenna port subset that needs to be measured and to feed back channel state information.

In practical applications, in order to facilitate selection, the set of antenna ports at the base station end can be divided into multiple antenna ports in advance.

Then, when selecting the antenna port subset to be measured for the UE, the antenna port subsets that have been divided are selected according to the current status information of the UE.

In the antenna port subset, just select the antenna port subset for the UE.

[0038] In this way, the base station can inform the UE of all possible aggregation methods in advance and identify various aggregation methods (for example,

When channel state information needs to be obtained, the identifier of one or more antenna port subsets is notified to the UE according to the state of the UE.

Channel state information measurement and feedback are performed on the set of corresponding identifiers.

[0039] For example, base station A is configured with N antenna ports, and the N antenna ports are divided into m antenna port subsets, namely N0,

N1, N2, .., Nm, where each antenna port subset may overlap with each other, for example, N0 may include antenna port 1 and antenna port 2;

N1 can include antenna port 2 and antenna port 3, where antenna port 2 is in both N0 and N1.

The actual situation determines, and no limitation is made here. Base station A can notify UE to measure one or more of the m antenna port subsets according to the UE status information.

or multiple or all antenna port subsets; then, the above UE feeds back the measured channel state information to base station A.

[0041] When the UE is required to report channel state information, the high-speed UE may be notified to measure only the antenna port subset applicable to the high-speed UE, and the

Feedback channel status information; notify low-speed UE to measure the antenna port subset suitable for low-speed UE and feed back channel status information.

This ensures that low-speed UEs do not waste resources, and that high-speed UEs can report channel status changes to the base station in a timely manner at a high enough frequency.

At the same time, both low-speed UE and high-speed UE do not need to measure all antenna ports, so the feedback overhead can be reduced, which is overall

Of course, for low-speed UEs, it is also possible to measure the high-speed antenna port subset and the low-speed antenna port subset at the same time.

set.

[0045] By using the method provided in the first embodiment, each antenna port of the base station can send a reference signal at a different frequency.

If the moving speed is fast, the UE can be notified to measure the reference signal of the antenna port subset with higher transmission frequency; otherwise, the UE is notified to measure the transmission frequency

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Therefore, the first embodiment also has the following advantages: it can ensure that the UE with fast moving speed can reflect

It can not only feed sufficiently accurate channel state information, but also ensure that there is no waste of resources for UEs with low mobility.

[0062] It should also be noted that since the UE may be in a certain default transmission mode in the initial state, the base station needs to

The UE determines whether to change the transmission mode of the UE based on the channel state information fed by the UE.

The channel state information of the UE is fed back. When the base station selects a new transmission mode for the UE based on the channel state information of the UE, it notifies the UE.

The UE only needs to feed back channel state information for the antenna port that is applicable to the transmission mode.

It is also possible to select another transmission mode for the UE based on the new status information. At this time, the corresponding antenna port subset can also be selected and notified.

The UE measures the antenna port subset and provides feedback.

It should be noted that the channel state information of a certain antenna port subset is obtained by measuring the channel state information of each antenna port in the antenna port subset.

The channel state mutual correlation information between antenna port subsets reflects the mutual correlation of channels between each antenna port subset.

For example, the channel state mutual correlation information between N1 and N2 may need to first calculate the channel state information CSI1 and CSI2 of N1 and N2 respectively.

Then the correlation between the two is calculated; the channel state information of the combined antenna port subset N12 of N1 and N2 is obtained by measuring each

The reference signal of the antenna port and the reference signal of each antenna port in N2 are obtained. which is equivalent to merging the two antenna port subsets to obtain

The channel state information of the combined set is obtained. For example, N1 includes antenna ports 1 and 2, N2 includes antenna ports 3 and 4, and the combined antenna port

The channel state information of the port subset N12 is calculated directly based on the reference signals of antenna ports 1, 2, 3, and 4.

Specifically, according to the current state information of the base station, the antenna port to be measured is selected from each pre-divided antenna port subset.

When the UE obtains a subset of antenna ports of a certain amount, the UE may first obtain the current state information of the UE from the base station; then, according to the current state information of the UE pre-agreed with the base station,

The corresponding relationship between the current status information and the antenna port subset is determined, and the antenna port to be measured is selected from each pre-divided antenna port subset.

In addition, when the UE feeds back the channel state information to the base station, it can also feed back the antenna port subset identifier to the base station.

information.

[0123] an identification information feedback unit, used to feed back the antenna port subset identification information to the base station.

[0124] Wherein, when the number of antenna port subsets to be measured is at least two, the feedback unit U702 includes:

a prescribed feedback subunit, configured to provide a feedback sequence of the channel state information and/or a group of antenna port subsets pre-agreed with the base station;

In a combined manner, channel measurement is performed on the antenna port subset that needs to be measured and channel state information is fed back. "

From the above. it can be seen that in Comparative Document 4. “when it is necessary to obtain channel state information. one or more antenna ports are sub-connected according to the state of the UE”

The identifier of the set is notified to the UE” is equivalent to “the first reference signal includes Q1 RS ports”, and the set of all antenna ports is L1 antenna ports;

And from the antenna port subset, it can be known that comparative document 4 discloses that "the Q1 antenna ports are a subset of the L1 antenna ports; the L1 is

A positive integer greater than Q1".

It can be seen that the reference document 4 discloses the above distinguishing features, and also solves the problem of selecting a channel state feedback port from all antenna ports.

The technical problem of some antenna ports, therefore, the comparative document 4 provides a technical inspiration for applying its technical means to the comparative document 1.

For a technician, it is a good idea to obtain the technical solution of claim 1 based on reference 1 and reference 4.

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It is obvious that claim 1 does not have outstanding substantive features and significant progress compared to the combination of reference document 1 and reference document 4.

Possess the creativity required by Article 22, Paragraph 3 of the Patent Law .

2. Dependent claim 2 refers to claim 1. Paragraph [0079] of the specification of reference 4 discloses (see above): Specifically, according to the

When the UE obtains its own current status information and selects the antenna port subset to be measured from the pre-divided antenna port subsets, the UE

The current state information of the UE can be first obtained from the base station; then the current state information of the UE and the antenna can be determined according to the pre-agreed state information of the UE and the antenna.

The corresponding relationship between the antenna port subsets is determined by selecting the antenna port subset to be measured from the pre-divided antenna port subsets.

When the base station feeds back the channel state information, the antenna port subset identification information can also be fed back to the base station.

In the embodiment 4, the UE selects the port subset to be measured according to its own state information and feeds back the antenna port subset identification information to be measured to the base station (corresponding to

When the user equipment sends the first information, the first information indicates Q3 antenna ports from the L1 antenna ports; the Q3 is less than or equal to

(or a positive integer equal to L1). Therefore, on the basis that claim 1 cited by it does not have an inventive step, claim 2 does not have an inventive step either.

The inventive step stipulated in Article 22, paragraph 3, of the Patent Law .

3. Dependent claim 3 refers to claim 1 or 2. Paragraphs [0037] and [0038] of the specification of reference 4 disclose (see above) that the base station can

The antenna port subset to be measured is selected for the UE and the antenna port subset identifier is notified to the UE (equivalent to receiving the second information. wherein the second information

The information indicates the Q1 antenna port from the L1 antenna port). Therefore, in the case where the claim 1 or 2 cited therein does not have an inventive step,

In this case, dependent claim 3 also does not possess the inventiveness required by Article 22, paragraph 3 of the Patent Law.

4. Dependent claim 4 refers to claim 1 or 2. Paragraphs [0124] and [0125] of the specification of reference 4 disclose (see above) that the UE can

The measurement information can be fed back according to the antenna port subset pre-negotiated with the base station (equivalent to the Q1 antenna ports among the Q antenna ports).

The position of the additional technical feature is determined by default). In addition, the additional technical feature also belongs to the common technical means in this field. Therefore, in the claims cited by it

If claim 1 or 2 does not involve an inventive step, dependent claim 4 also does not involve an inventive step as required by Article 22, paragraph 3 of the Patent Law.

5. Dependent claim 5 refers to claim 1 or 2. Paragraph [0149] of the specification of reference 1 discloses (see above) that a day

The information obtained from the line set, such as the precoding weight value, is applied to the transmission based on another CSI-RS, that is, the antenna of some antenna ports can be disclosed.

The parameters are used to determine other antenna ports, and those skilled in the art know that precoding weighting or beamforming is performed by weighting the antenna array.

Therefore, the comparative document 1 gives the process of generating a vector signal with spatial distribution characteristics by which the beamforming vectors of Q1 antenna ports are

The technical enlightenment for determining the beamforming vector corresponding to the transmitting antenna port of the second signaling, a person skilled in the art based on the reference document 1

The additional technical features of claim 5 can be obviously obtained by combining the common technical means in the art.

If claim 1 or 2 does not involve an inventive step, dependent claim 5 also does not involve an inventive step as required by Article 22, paragraph 3 of the Patent Law.

6. Dependent claim 6 refers to claim 1 or 2. Paragraph [0111] of the specification of reference 1 discloses that the base station

The first channel information is used to send a data signal (equivalent to receiving a first wireless signal, and the first channel information is used to generate the first wireless signal).

If the claim 1 or 2 cited by it does not have an inventive step, the dependent claim 6 also does not have an inventive step as stipulated in Article 22, Paragraph 3 of the Patent Law.

Creativity.

7. Claims 7-12 protect a method in a base station for multi-antenna transmission, which comprises the same method steps as those in claims 1-6.

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The methods in the user equipment correspond one to one. Based on the similarity of claims 1 to 6, claims 7 to 12 also do not have the characteristics of Article 22, Paragraph 3 of the Patent Law.

The creativity stipulated in paragraph 1.

8. Claims 13-24 respectively protect a user equipment and a base station for multi-antenna transmission, including the functions and rights implemented by each functional module.

The method steps in claims 1-12 correspond one to one, see claims 1-12 for the description of the disclosure of reference 1, which discloses

User equipment and base station, in addition, the method steps for setting each functional module in the device to complete the corresponding functions belong to the common knowledge in the art, therefore,

Based on the similarity of the comments to claims 1-12, claims 13-24 are superior to reference documents 1 and 4 and the common knowledge in the art.

The combination does not possess the creativity required by Article 22, paragraph 3 of the Patent Law .

In view of the fact that the applicant's grounds for invalidation of claims 1-24 of this patent are not inventive, the panel considers the applicant's other grounds for invalidation.

The valid reasons and evidence will not be reviewed further.

Based on the above facts and reasons, the collegial panel of this case made the following review decision.

III. Decision

It is declared that all invention patent rights No. 201610940656.0 are invalid.

If a party is dissatisfied with this decision. it may file a complaint with the Beijing Patent Office within three months from the date of receipt of this decision in accordance with Article 46. Paragraph 2 of the Patent Law.

According to the provisions of this paragraph, after one party files a lawsuit, the other party may participate in the lawsuit as a third party.

Head of the panel: Wu Lei Chief judge:

Wu Weimin Counselor: Guo Qiong

Patent Office Reexamination and Invalidation Trial Department