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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte RUNHUA CHEN

Appeal 2017-002913
Application 13/970,546
Technology Center 2400


JURGOVAN, Administrative Patent Judge.

DECISION ON APPEAL

Appellant seeks review under 35 U.S.C. § 134(a) from the Examiner’s Final Rejection of claims 1–29, 32–43, 46–57, and 60–63, constituting the only claims before us on appeal. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

1 The Appeal Brief indicates the real party in interest is Texas Instruments Incorporated. Appeal Brief 1.
2 Claims 30, 31, 44, 45, 58, and 59 were indicated as canceled by the Amendment filed March 10, 2016.
3 Our Decision refers to the Specification (“Spec.”) filed August 19, 2013, the Final Office Action (“Final Act.”) mailed December 10, 2015, the Appeal Brief (“App. Br.”) filed March 11, 2016, the Examiner’s Answer
CLAIMED INVENTION

The claimed invention relates to fall-back rate-matching and timing for user equipment (UE) configured for downlink (DL) Coordinated Multi-Point Transmission (CoMP). Spec. Abstract. CoMP is a feature of Long Term Evolution (LTE) and Long Term Evolution-Advanced (LTE-A) which is used to send and receive data to and from a UE and multiple transmission points (i.e., eNodeBs or eNBs). Spec. ¶ 14. During communication, it is sometimes necessary for the CoMP UE with multiple-layer transmission to fall-back to a single-layer transmit diversity (TxD)-based transmission. Fall-back may be necessary for a variety of reasons, such as when a large number of UEs need to be scheduled by the network in one subframe, or when the network needs to switch a UE from one transmission mode to another, or when the network determines channel quality has deteriorated and it is necessary to fall-back to the more robust single-layer TxD-based transmission scheme to ensure the downlink connection is not lost. Spec. ¶¶ 32–34.

To fall-back, a CoMP UE needs to know the Cell-specific Reference Signal (CRS) Resource Elements (EE) to use for rate-matching on the Physical Downlink Shared Channel (PDSCH). Spec. ¶ 36. Rate-matching is used to match the fixed bit rate of the cellular transmission frame to the varying bit rate of information transported in the frames. Rate-matching is generally accomplished by repeating or puncturing data, that is, adding or deleting redundant data. 3GPP TS 25.212 8.11 (2002).

According to Appellant, current fall-back Downlink Control Information (DCI) format 1A assumes single-cell mapping and carries no
information regarding the CRS for PDSCH rate-matching. Spec. ¶ 36. In a fall-back situation, the claimed invention rate-matches on PDSCH around the serving cell CRS or another cell whose CRS pattern is a subset of the serving cell. Alternatively, one of a set of CRS RE may be signaled to the UE by higher layer signaling (i.e., Radio Resource Control (RRC)). Id.

In the claimed invention, PDSCH timing is also signaled to the CoMP UE. Spec. ¶ 39. The UE may use the timing of the serving cell CRS or may use one of multiple timing assumptions indicated by higher layer signaling. ¶ 40. CRS RE and timing may be jointly encoded in the DCI format. Spec. ¶ 39.

Claims 1, 10, and 18 are independent. Claim 1, reproduced below, is illustrative of the claimed invention:

1. A method for determining physical downlink shared channel (PDSCH) rate-matching comprising:
   - receive a fall-back transmission from a base station at a user equipment (UE) configured for downlink coordinated multi-point transmission (CoMP); and
   - in response to the fall-back transmission, perform PDSCH demodulation assuming PDSCH rate-matching based upon a default cell-specific reference symbol (CRS) resource element (RE) set.

Claims App’x 1–2.

Claim 18 is similar to claim 1 but is directed to a UE rather than a method. Claim 10, reproduced below, is directed to a method for determining PDSCH timing:

10. A method for determining physical downlink shared channel (PDSCH) timing comprising:
receive a fall-back transmission from a base station at a user equipment (UE) configured for downlink coordinated multi-point transmission (CoMP); and in response to the fall-back transmission, perform PDSCH demodulation using a default PDSCH timing assumption.

Claims App’x 3.

REJECTIONS


ANALYSIS

We review the appealed rejections for error based upon the issues identified by Appellant, and in light of the arguments and evidence produced thereon. Ex parte Frye, 94 USPQ2d 1072, 1075 (BPAI 2010) (precedential). Arguments not presented on appeal are waived. 37 C.F.R. § 41.37(c)(1)(iv).

Section 103 forbids issuance of a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” KSR Int’l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007) (“KSR”). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art, (2) any
differences between the claimed subject matter and the prior art, (3) the level of skill in the art, and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

**REJECTION #1**

A. Independent Claims 1 and 18

The Examiner finds that Gaal discloses the claimed “receive a fall-back transmission from a base station at a user equipment (UE) configured for downlink coordinated multi-point transmission.” Final Act. 4, 9 (emphasis added). Appellant argues Gaal is limited to multiple-input multiple-output (MIMO) of LTE releases 8, 9, and 10, and thus could not disclose the claimed Coordinated Multipoint Transmission (CoMP) which was adopted later in LTE Release 11. App. Br. 17–18; Reply Br. 1–6. In this regard, however, Gaal states “[i]n order to be future compatible, particularly for CoMP (cooperative multipoint transmissions) operation, PDSCH muting [configuration] was agreed to be supported in LTE Rel-10.” Gaal ¶ 67. Thus, Gaal demonstrates CoMP was known in the art. Likewise, Blankenship (¶ 41) indicates CoMP was known. Those of ordinary skill in the art understand that development of 3GPP standards require many months or years before finalization as a release. Thus, the general concepts that later became the CoMP standard required development long before their adoption by 3GPP as a final release. Accordingly, Appellant’s argument is not persuasive.

Appellant argues that Gaal does not disclose that the muted REs provide protection of CSI-RS REs of the neighboring cells to facilitate DL

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4 In many places in the Appeal Brief and Reply Brief, Appellant underlines, bolds and/or italicizes certain parts of the claims. Merely emphasizing
CoMP operation, nor how DL CoMP operates using the muted REs, and that the foregoing is not inherent in Gaal’s disclosure. App. Br. 18–20. Gaal’s disclosure is evaluated from the perspective of a person of ordinary skill in the art, who is “a person of ordinary creativity, not an automaton.” KSR, 550 U.S. at 420–421. Appellant’s argument is not persuasive to show that a person of ordinary skill in the art would not have known how to implement “PDSCH rate matching around the muted REs.” Gaal ¶ 68.

Appellant next argues Gaal does not disclose the claimed “in response to the fall-back transmission, perform PDSCH demodulation.” App. Br. 24. Specifically, Appellant argues Gaal fails to disclose fallback transmission or any response thereto and only mentions PDSCH in the context of decoding a unicast PDSCH or rate matching but not demodulation. Id. As the Examiner found, however, Gaal discloses fallback transmission (¶¶ 59, 60) and PDSCH demodulation (¶¶ 63, 64). Final Act. 4. A person of ordinary skill in the art would have understood that PDSCH demodulation is needed in a fall-back scenario. It would have been obvious to use CRS REs to obtain the parameters necessary for demodulating the received data. Appellant’s argument does not address what would be the point of Gaal’s UE performing rate-matching around the muted PDSCH REs (¶ 68) if it did not ultimately use the rate-matching to demodulate the associated data.

Appellant argues Gaal fails to disclose the claimed “assuming PDSCH rate-matching based upon...a resource element (RE) set.” App. Br. 24–26. Appellant’s argument does not address that Gaal’s muted REs may be considered a “resource element set.” Gaal ¶ 68. In addition, Blankenship

certain claim language in some way is insufficient to constitute an argument for patentability.
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(¶ 36, Figs. 3, 4) discloses CRS RE sets for antenna port 0 and antenna port 1, as shown below.

Blankenship’s Figure 4 shows sets of CRS signals R0 and R1 in the control region (i.e., DCI) and PDSCH for antenna ports 0 and 1.

Appellant contends that the Examiner admits that Gaal does not disclose a default CRS RE set. App. Br. 26–28; Reply Br. 6–8; Final Act. 4, 10. The Specification in this case does not define what is meant by the term “default.” One dictionary defines the term as “computers: a selection automatically used by a program in the absence of a choice made by the user.” https://www.merriam-webster.com/dictionary/default (last viewed 2/11/19). This definition accords with our understanding of what the claimed term would have signified to a person of ordinary skill in the art.

Gaal states “a Rel-10 UE may assume PDSCH rate matching around the muted REs.” Gaal ¶ 68. The word “assume” in this sentence appears to connote that the UE is to consider the muted REs as a default to use for rate-matching. Moreover, Blankenship (¶ 36) states “cell-specific reference signals (CRSs) can be transmitted over each antenna port on certain pre-
defined time and frequency REs in every subframe.” The word “pre-defined” means that the UE is to assume CRS signals are carried in the pre-defined time and frequency, and in that sense, the CRS REs are a default set (or at least are suggestive of one). Also, in Blankenship (¶ 87), the first transmission of CRS REs from eNB to UE may be considered a default, which may be subsequently changed using new DCI.

Accordingly, we are not persuaded the Examiner errs in the § 103 rejection of claims 1 and 18.

Claims 2 and 7

Claim 2 recites “The method of claim 1, wherein the default CRS RE set is the serving base station CRS RE set.” Claim 7 recites a similar feature. We select claim 2 as representative of the group of claims. 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner finds that Blankenship discloses the claimed features. Final Act. 5 citing Blankenship ¶ 140. Appellant argues the Examiner errs because “[t]here is no disclosure of the concept of CRS, CRS RE or CRS RE set or teaching that the default CRS RE set is the serving base station CRS RE set in [0140].” App. Br. 29–30; Reply Br. 8–9.

Blankenship (¶ 36, Figs. 3, 4) discloses CRSs in the control region (i.e., DCI) and PDSCH for multiple antenna ports used for DL channel estimation and demodulation. Blankenship (¶ 140) also discloses that a serving cell uses PDCCH to transmit DCI assignment (which may imply CRSs) to a UE. Thus, the CRS RE set is indicated by the serving base station, and is thus a “serving base station CRS RE set.” See In re Am. Acad. of Sci. Tech. Ctr., 367 F.3d 1359, 1369 (Fed. Cir. 2004) (“[T]he PTO is obligated to give claims their broadest reasonable interpretation during examination.”) Accordingly, the Examiner does not err in finding the
combination of Gaal and Blankenship discloses the claimed feature under broadest reasonable interpretation.

Claims 3, 8, 22, and 50

Claim 3 recites “The method of claim 1, wherein the default CRS RE set is the first CRS RE set of a plurality of CRS RE sets configured by a radio resource control (RRC) higher layer.” Claims 8, 22, and 50 recite similar limitations. We select claim 3 as representative of the group. 37 C.F.R. § 41.37(c)(1)(iv).


As we have discussed, Blankenship discloses CRS RE sets for antenna port 0 and antenna port 1 (see Blankenship’s Figure 4, supra) at least one of which must be used as a default upon commencement of communication with the eNB. Gaal (¶ 45) indicates that the RRC higher layer (Layer 3) configures lower layers using RRC signaling between the eNB and UE. Accordingly, Appellant’s argument fails to persuade us that the Examiner errs in finding the claimed feature disclosed by the references.

Claim 4

Claim 4 recites “The method of claim 1, wherein the fall-back transmission is on a compact downlink control information (DCI) format.” The Examiner finds this feature disclosed in Gaal (¶¶ 59, 60) as DCI format 1A used with a fallback operation. Final Act. 5. Appellant argues that Gaal fails to disclose that DCI format 1A is selected because it is a compact DCI format. App. Br. 31–32.

However, claim 4 does not mention selecting DCI format 1A because it is compact. As this limitation does not appear in the claim, it cannot serve
as a basis for patentability. See In re Self, 671 F.2d 1344, 1348 (CCPA 1982). Appellant does not dispute that DCI format 1A is compact. In addition, DCI format 1A is recognized in the art as a compact format. http://www.rfwireless-world.com/Terminology/LTE-DCI-format-use-case.html (last viewed 2/11/19). Thus, we find Appellant’s argument unpersuasive to show Examiner error.

Claim 5

Claim 5 recites “The method of claim 4, wherein the DCI format is fall-back scheduling on a DCI 1A format.” Appellant argues claim 5 on the same basis as claim 4. We are not persuaded the Examiner errs in finding Gaal (¶¶ 59, 60, 85) discloses the claimed feature. Final Act. 5. Gaal (¶ 59) specifically discloses use of DCI format 1A for fallback.

Claims 6, 9, and 19

Claim 6 recites:

6. The method of claim 1, further comprising:
   determine a value of a CRS resource element (RE) signaling field in a downlink control information (DCI) signal received from a base station; and
   if no fall-back transmission is received, perform PDSCH demodulation assuming rate-matching based upon a CRS RE set corresponding to the value in the downlink control signal. 5

Claim 19 recites a similar limitation. Appellant argues claims 9 and 19 on the same basis as claim 6. App. Br. 36. We select claim 6 as representative.

The Examiner finds Gaal teaches various DCI formats (1, 1B, 1D, 2, 2A, 2B, 2C) signaling corresponding CRS RE sets to the UE. Final Act. 6 citing Gaal (¶¶ 55–57, 86–88). The Examiner also finds Gaal teaches

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5 Examiner and Appellant are advised to consider whether “downlink control signal” has proper antecedent basis in claim 6.
monitoring PDCCH signaling, decoding the DCI format therein, and using the same to decode and demodulate the corresponding PDSCH. Gaal ¶¶ 55–57, 64, 77. Appellant argues that the values of the DCI formats noted by the Examiner are not actual values signaled in a CRS RE signaling field of the DCI signal. App. Br. 33–34. Appellant further argues Gaal (¶ 64) does not disclose “if no fall-back transmission is received — then perform PDSCH demodulation.” Id.

The broadest reasonable interpretation of a conditional “if” step in a method claim reads out that limitation because it is not required in its performance. See In re Schulhauser, Appeal 2012-007847 (April 28, 2016) (precedential). Accordingly, we do not give patentable weight to the conditional limitation. What remains of the claim is a mere statement to determine a value in the DCI signal. As the recited claim does not require use the value for any purpose, this recitation lacks the weight necessary to confer patentability.

Thus, Appellant’s arguments do not persuade us the Examiner errs in the rejection of claims 6 and 19, or of claim 9, for which no separate arguments are made (see App. Br. 36).

Claim 20

Appellant presents the same arguments for claim 20 as presented for claims 7 and 8. App. Br. 38–40. For the reasons stated, Appellant’s arguments are unpersuasive.

Claims 21, 23, and 51

Claim 21 recites “The method of Claim 3, wherein the plurality of CRS RE sets configured by a radio resource control (RRC) higher layer is four sets.” Claims 23 and 51 recite similar limitations. We select claim 21 as representative.
The Examiner concedes that Gaal and Blankenship do not disclose four sets of CRS REs but finds this would be an obvious design choice for a number of antenna ports to transmit the CRS sets more flexibly and reliably. Final Act. 6–7. Appellant argues the Examiner provided no evidence that the above limitations are “more flexible and reliable.” App. Br. 40–41.

As noted Gaal (¶ 45) discloses configuring lower layers using RRC signaling with DCI using transmit diversity (¶ 60). Furthermore, Gaal mentions a 4 x 4 antenna configuration and Blankenship (¶ 36, Figs. 3, 4) shows use of different CRS patterns for different antenna ports in the control region (i.e., DCI) as well as PDSCH. Putting these disclosures together, a person of ordinary skill in the art would have considered it obvious to provide four CRS RE sets, one for each of four antennas. Thus, Appellant’s argument is not persuasive.

Appellant does not explain why it would have been “uniquely challenging or difficult for one of ordinary skill in the art” to extend Blankenship’s disclosure of two antenna ports to four along with corresponding sets of CRS REs configured by RRC signaling, particularly in view of Gaal’s disclosure of a 4 x 4 antenna configuration. *Leapfrog Enterprises, Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007) (“Leapfrog”). The modification from two to four antenna ports requiring corresponding sets of CRS REs would indeed have provided greater flexibility and reliability by providing greater transmit diversity and antenna combinations to support communications.

*Claim 24, 25, 52, and 53*

Claim 24 recites “The method of Claim 1, wherein the CRS RE set comprises a set of CRS resource elements that are associated to one or a set
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of transmission points in CoMP transmission.” Claims 25, 52, and 53 recite similar limitations. We select claim 24 as representative.

The Examiner finds Gaal (¶¶ 67, 71) and Blankenship (¶¶ 40–44) disclose CoMP transmission. The Examiner also finds Gaal (¶¶ 60–62) and Blankenship (Table 1, ¶¶ 36–38) disclose a CRS RE set. Appellant argues Blankenship discloses MIMO transmission, not CoMP, and that Blankenship discloses resource elements but not CoMP REs. App. Br. 41–42. Appellant presented these arguments with respect to claims 1 and 18 and they are unpersuasive for the same reasons.

Claims 26–29, 32, 33, 54–57, 60, and 61

Claim 26 recites “The method of Claim 1, wherein a two bit signaling field in DCI format for CoMP scheduling is used to dynamically signal one of four CRS RE sets for PDSCH rate-matching.” Claims 27–29, 32, 33, 54–57, 60, and 61 recite similar features and/or depend from claim 26. We select claim 26 as representative.

The Examiner concedes Gaal and Blankenship do not disclose a two bit signaling field in DCI or use of four CRS RE sets. Final Act. 8. However, the Examiner finds it would be an obvious design choice to select a two-bit field to signal four CRS sets to provide greater flexibility and reliability. Id. The Examiner further finds Blankenship (Table 1) discloses the claimed feature. Ans. 8. Appellant argues the Examiner provided no evidence that using two bits to signal one of the four CRS RE sets would be more flexible and reliable.

We do not agree with Appellant’s arguments. We note that Appellant does not respond to the Examiner’s finding that Blankenship (Table 1) discloses four formats, where each format has corresponding resource element groups (REGs), which teaches the claimed feature of “four CRS RE...
sets.” See Ans. 8. Signaling one of four CRS RE sets provides flexibility by allowing one of four CRS RE sets to be used by the UE depending on the system bandwidth and the number of OFDM symbols configured for the control region. Blankenship ¶ 39. The network can signal the UE the best CRS RE set to use to communicate with the eNB, increasing reliability of communications between the UE and eNB. We do not agree with Appellant’s argument that implementing the signal using two bits would require undue experimentation. App. Br. 42. We agree with the Examiner that using two bits to indicate one of the four RE sets taught by Blankenship was within the level of ordinary skill. See KSR, 550 U.S. at 418; In re Preda, 401 F.2d 825, 826 (CCPA 1968); In re Paulsen, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Accordingly, Appellant’s arguments do not persuade us of Examiner error.

Claims 34, 35, 62, 63

Claim 34 depends from claim 26 and recites “The method of Claim 26, wherein when a CRS RE set corresponds to a combination of multiple single-cell CRS patterns, the CRS RE set is used for joint transmission from multiple cells.” Claims 35, 62, and 63 recite similar limitations. We select claim 34 as representative.

The Examiner finds Gaal and Blankenship disclose joint transmission from multiple cells. Final Act. 9 citing Gaal ¶¶ 62, 65, 71, Fig. 2, Blankenship ¶ 41. Appellant concedes Blankenship discloses joint transmissions from a single cell but argues the reference fails to disclose joint transmissions from multiple cells. App. Br. 48.

We agree with the Examiner that Gaal (¶ 71) and Blankenship (¶ 42) disclose joint transmission from multiple cells in CoMP. We also note that, although not cited in the rejection of claim 34, Zhang (¶ 70) specifically
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mentions Joint Transmission (JT) CoMP, demonstrating it was a known feature of CoMP. Accordingly, when Gaal and Blankenship mention CoMP, it is understood to include JT CoMP as one aspect. In this regard, we note that one may use extrinsic evidence to show the meaning of claim terms. In re Baxter Travenol Labs., 952 F.2d 388, 390–391 (Fed. Cir. 1991) (extrinsic evidence showed those skilled in the art would have known that blood bag was plasticized with di–2–ethylhexyl phthalate (DEHP)). Thus, Appellant fails to persuade us that the Examiner errs in the rejection.

REJECTION #2

Claim 10

Claim 10 is independent and is set forth below:

10. A method for determining physical downlink shared channel (PDSCH) timing comprising:
   receive a fall-back transmission from a base station at a user equipment (UE) configured for downlink coordinated multi-point transmission (CoMP); and
   in response to the fall-back transmission, perform PDSCH demodulation using a default PDSCH timing assumption.


Specifically, Appellant argues

one having ordinary skill in the art would not confuse or equate Zhang’s “fall-back PDCCH format” with “fall-back transmission.” A fall-back format is just another format that can be part of a transmission. Zhang describes neither a default configuration nor a fall-back transmission.

App. Br. 59. However, Zhang discloses monitoring a fall-back PDCCH format, and PDCCH is a control channel transmission on the down link from
eNB to UE. Thus, we do not agree that Zhang fails to disclose a fall-back transmission. Moreover, Blankenship (¶ 92, 119) also discloses a fall-back PDCCH scheme. In any case, Appellant presents no evidence to support that a fall-back PDCCH format is something unrelated to a fall-back transmission. Attorney argument is not evidence. In re Pearson, 494 F.2d 1399, 1405 (CCPA 1974); see also In re Geisler, 116 F.3d 1465, 1470 (Fed. Cir. 1997) and In re Huang, 100 F.3d 135, 139–140 (Fed. Cir. 1996).

Appellant avers that Blankenship fails to disclose a “default PDSCH timing assumption” as claimed. App. Br. 59–62. However, as the Examiner notes, Blankenship discloses a default timing PDSCH timing assumption with pre-defined (i.e., default) time and frequency REs. Final Act. 2, 14 citing Blankenship Figs. 3–4, ¶¶ 36, 37, 119. Appellant fails to persuade us that the Examiner errs in finding the cited parts of Blankenship disclose the claimed feature.

Claim 11

Claim 11 recites “The method of claim 10, wherein the default PDSCH timing is timing for a default cell-specific reference symbol (CRS) resource element (RE) set or a channel state information reference signal (CSI-RS) resource.” The Examiner finds this feature disclosed by the combination of Blankenship and Zhang. Final Act. 14, Ans. 14 citing Blankenship ¶¶ 36, 11, Zhang ¶ 69.

Appellant argues the Examiner’s rejection is unclear regarding whether the Examiner is relying on Blankenship’s CRS or CSI-RS REs as disclosing the claimed feature. App. Br. 63. Review of the cited passages reveals that the Examiner relies on both types of reference signals to disclose the claimed feature. Specifically, Zhang (¶ 69) mentions both types of reference signals.
Appellant again argues the cited references do not disclose a “default.” As explained with regard to claim 10, Blankenship’s discloses a default timing PDSCH timing assumption with pre-defined (i.e., default) time and frequency REs. Final Act. 2, 14 citing Blankenship Figs. 3–4, ¶¶ 36, 37, 119.

Claims 12–17

Appellant submits no separate arguments for claims 12–17. App. Br. 64–65. Accordingly, these claims fall for the reasons stated regarding the claims from which they depend. 37 C.F.R. § 41.37(c)(1)(iv).

Claim 36

Claim 36 recites “The method of claim 11, wherein the default CRS RE set is one of a plurality of CRS RE sets configured by a radio resource control (RRC) higher layer.” The Examiner finds the claimed feature disclosed in Blankenship (¶¶36, 37, 88, 119). Final Act. 16, Ans. 12. Appellant argues Blankenship fails to disclose “a default CRS RE set” and the additional requirement that the CRS RE set is “one of a plurality of CRS RE sets.” Final Act. 65–66.

We have already addressed the “default” argument with respect to claim 10. Regarding the “one of a plurality of CRS RE sets” argument, we agree with the Examiner that Blankenship (¶¶ 36, 37, Figs. 3, 4) disclose the claimed feature. For example, see Blankenship’s Figure 4, supra, which discloses two CRS RE sets, one for each of antenna ports 0 and 1. Thus, we find Appellant’s arguments unpersuasive to show the Examiner errs in finding the claimed feature disclosed by Blankenship.

Claim 37

Claim 37 recites “The method of Claim 36 wherein the plurality of CRS RE sets configured by a radio resource control (RRC) higher layer is
four sets.” The Examiner acknowledges that Blankenship does not disclose the claimed feature, but contends that selection of four CRS RE sets is a matter of design choice absent a showing of criticality. Final Act. 16–17, Ans. 12. Appellant contends “that the Examiner has provided no logical reasoning why one of ordinary skill in the art would select to configure four CRS RE sets versus fewer or more.” App. Br. 66.

We do not agree with Appellant’s argument. Blankenship (¶¶36, 37, Figs. 3, 4) shows CRS RE sets for two antennas, and one of ordinary skill in the art would have considered it obvious to extend the CRS RE sets for two antennas to four. Moreover, Zhang (¶ 42) discloses the possibility of using multiple UE antennas. Furthermore, Zhang (Tables 2 and 3) explicitly mention the possibility of using four layers on ports 7–10 signaled by codeword 3. Thus, Appellant fails to persuade us the Examiner errs in finding four CRS RE sets would have been an obvious design choice for one of ordinary skill in the art considering the references.

Claims 38 and 39

Claim 38 recites “The method of Claim 11, wherein the CRS RE set comprises a set of CRS resource elements that are associated to one or a set of transmission points in CoMP transmission.” Claim 39 recites a similar limitation but depends from claim 36. We select claim 38 as representative.

The Examiner finds the claimed feature disclosed by the combination of Zhang and Blankenship. Final Act. 17, Ans. 12 citing Zhang ¶¶ 69, 176, 197, Blankenship ¶¶ 36, 41–44, Fig. 3, Table 1). Appellant argues Blankenship discloses MIMO, not CoMP, and that Blankenship does not disclose a “set” of CRS REs. App. Br. 67.

Zhang (Abstract, ¶¶ 8–11, 13, 69, 176, 197) repeatedly mentions CoMP and states that its wireless transmit/receive unit (WTRU) (i.e., UE)
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can be switched between joint transmission (JT) CoMP and single-cell
MIMO operation. Blankenship (¶¶ 41–44) also mentions MIMO and CoMP.
Blankenship (¶¶ 36, 37, Figs. 3 and 4) shows CRS RE sets. See
Blankenship’s Fig. 4, supra. Thus, Appellant’s argument fail to persuade us
that the Examiner errs.

Claims 40–43, 46 and 47

Claim 40 recites “The method of Claim 10, wherein a two bit
signaling field in DCI format for CoMP scheduling is used to dynamically
signal one of four CRS RE sets for PDSCH rate-matching.” Claims 41–43,
46, and 47 recite the same or similar feature. We select claim 40 as
representative.

The Examiner finds using two bits to signal one of four sets would
have been an obvious design choice considering the references. Final Act.
17, Ans. 12 citing Zhang ¶¶ 69, 72; Blankenship ¶¶ 36, 126, Fig. 3. The
Examiner also finds Blankenship (Table 1) discloses the claimed feature.
Ans. 12. Appellant argues the Examiner provided no evidence that using
two bits to signal one of the four CRS RE sets would be more flexible and

Appellant’s arguments are unpersuasive. At the outset, we note that
Appellant does not respond to the Examiner’s finding that Blankenship
(Table 1) discloses the claimed feature. In addition, a person of ordinary
skill would understand that signaling one of four CRS RE sets provides
flexibility by allowing the network to select the best of the four sets to
support communications between the UE and eNB, thus increasing the
reliability of the communications between the UE and eNB. Accordingly,
Appellant’s arguments do not persuade us of Examiner error.
Claims 48 and 49

Claim 48 recites “The method of Claim 11, wherein when the CRS RE set corresponds to a combination of multiple single-cell CRS patterns, the CRS RE set is used for joint transmission from multiple cells.” The Examiner finds the claimed feature disclosed by Blankenship. Final Act. 18, Ans. 12–13 citing Blankenship ¶¶ 36, 41, Zhang ¶¶ 69, 114, 115, Fig. 1F. Appellant argues Blankenship discloses joint transmissions from a single cell, not joint transmission from multiple cells. App. Br. 72–73.

Appellant’s argument is not persuasive as presented. Blankenship (¶ 41) mentions CoMP, which stands for Coordinated Multi-Point Transmission. Those of ordinary skill in the art understood CoMP to encompass joint transmission from multiple cells. Zhang (¶ 70) explicitly mentions joint transmission (JT) CoMP. Thus, we do not agree Blankenship is limited to only joint transmissions from a single cell.

B. Conclusion

Except where otherwise noted, we adopt as our own the Examiner’s findings and conclusion of obviousness as set forth in the Final Office Action and Answer for all claims. Final Act. 2–18; Ans. 2–13.

DECISION

We affirm the Examiner’s decision to reject claims 1–29, 32–43, 46–57, and 60–63 under 35 U.S.C. § 103(a).

AFFIRMED