



(51) International Patent Classification:

H04W 52/32 (2009.01) *H04W* 52/50 (2009.01)
H04W 52/14 (2009.01) *H04W* 74/08 (2009.01)
H04W 52/24 (2009.01)

(21) International Application Number:

PCT/US2018/031254

(22) International Filing Date:

04 May 2018 (04.05.2018)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/501,505 04 May 2017 (04.05.2017) US

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(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,

(54) Title: RACH POWER OFFSET

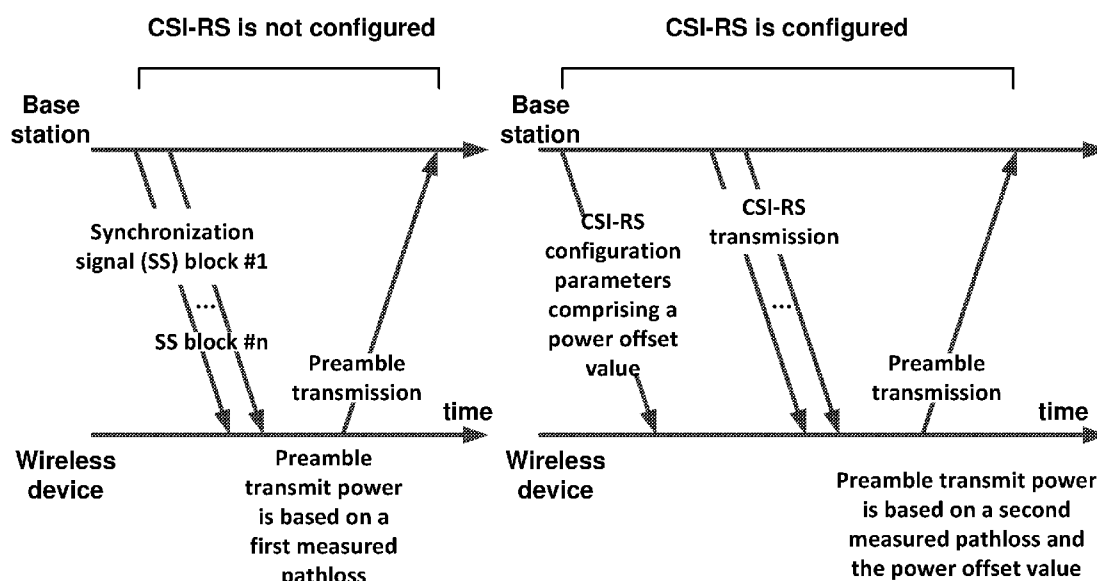


FIG. 34

(57) **Abstract:** A wireless device receives at least one radio resource control message comprising one or more configuration parameters of a cell. A control order for transmission of a random access preamble is received via the cell. A transmission power is determined for the random access preamble based on a pathloss measurement. When the one or more configuration parameters comprise one or more parameters of a channel state information reference signal (CSI-RS) for the cell: the pathloss measurement is based on the CSI-RS; and the determining the transmission power employs a power offset value indicated by the one or more configuration parameters. When the one or more configuration parameters do not comprise CSI-RS parameters for the cell: the pathloss measurement is based on at least one synchronization signal; and the determining the transmission power does not employ the power offset value. The random access preamble is transmitted based on the transmission power.



HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to the identity of the inventor (Rule 4.17(i))*
- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
- *of inventorship (Rule 4.17(iv))*

Published:

- *with international search report (Art. 21(3))*
- *with amended claims (Art. 19(1))*

Date of publication of the amended claims:

31 January 2019 (31.01.2019)

AMENDED CLAIMS

received by the International Bureau on 14 December 2018 (14.12.2018)

1. A method comprising:
 - receiving, by a wireless device, at least one radio resource control message comprising one or more configuration parameters of a cell;
 - receiving, by a wireless device, a control order for transmission of a random access preamble via the cell;
 - determining, for the random access preamble, a transmission power based on a pathloss measurement, wherein:
 - when the one or more configuration parameters comprise one or more parameters of a channel state information reference signal (CSI-RS) for the cell:
 - the pathloss measurement is based on the CSI-RS; and
 - the determining the transmission power employs a power offset value indicated by the one or more configuration parameters; and
 - when the one or more configuration parameters do not comprise CSI-RS parameters for the cell:
 - the pathloss measurement is based on at least one synchronization signal; and
 - the determining the transmission power does not employ the power offset value; and
 - transmitting the random access preamble based on the transmission power.
2. The method of claim 1, wherein the CSI-RS is a periodic CSI-RS.
3. The method of claim 1 or 2, wherein the one or more parameters of the CSI-RS indicate a periodicity of the CSI-RS.
4. The method of any of claims 1 to 3, wherein the one or more parameters of the CSI-RS indicate at least one of one or more CSI-RS subcarriers of resource elements or a CSI-RS sequence.
5. The method of any of claims 1 to 4, wherein the one or more messages comprises at least one of a reference signal power value, a preamble base station received target power, or a configured wireless device transmit power for the cell.
6. The method of any of claims 1 to 5, wherein the transmission power is based on a sum of a preamble base station received target power and a value of the pathloss measurement.
7. The method of claim 6, wherein the value of the pathloss measurement is based on a reference signal power value minus a measured received power value of a reference signal, wherein:

when the one or more configuration parameters comprise one or more parameters of the CSI-RS for the cell: the reference signal is the CSI-RS; and

when the one or more configuration parameters do not comprise CSI-RS parameters for the cell: the reference signal is at least one synchronization signal.

8. The method of any of claims 1 to 7, wherein the determining the transmission power is further based on a reference signal power value.
9. The method of any of claims 1 to 8, wherein the transmission power employs the value of the pathloss measurement determined based on a received power of the CSI-RS.
10. The method of any of claims 1 to 9, wherein when the one or more configuration parameters comprise one or more parameters of the CSI-RS, the transmitting the random access preamble uses at least one random access channel, wherein the one or more messages indicate:
 - an association between one or more synchronization signals and the CSI-RS; and
 - an association between the at least one random access channel and the one or more synchronization signals.
11. A method comprising:
 - receiving, by a wireless device, one or more messages indicating:
 - one or more configuration parameters of a channel state information reference signal (CSI-RS) of a cell; and
 - a power offset value associated with the CSI-RS of the cell;
 - receiving a control order for transmission of a random access preamble via the cell;
 - determining a transmission power for the random access preamble, wherein in response to the wireless device being configured with the CSI-RS for the cell, the transmission power is at least based on the power offset value; and
 - transmitting, by the wireless device, the random access preamble using the transmission power.
12. The method of claim 11, wherein the CSI-RS is a periodic CSI-RS.
13. The method of claim 11 or 12, wherein the determining the transmission power for the random access preamble is based on a pathloss measurement.
14. The method of claim 13, wherein the value of the pathloss measurement is based on a reference signal power value minus a measured received power value of a reference signal, wherein:
 - when the one or more configuration parameters comprise one or more parameters of the CSI-RS for the cell: the reference signal is the CSI-RS; and

when the one or more configuration parameters do not comprise CSI-RS parameters for the cell: the reference signal is at least one synchronization signal.

15. The method of any of claims 11 to 14, wherein the transmission power is based on a sum of a preamble base station received target power and the value of the pathloss measurement.
16. The method of any of claims 11 to 15, wherein the transmission power employs a value of the pathloss measurement determined based on a received power of the CSI-RS.
17. The method of any of claims 11 to 16, further comprising determining the transmission power for the random access preamble, wherein, in response to the wireless device being not configured with the CSI-RS for the cell:
 - the pathloss measurement is based on at least one synchronization signal; and
 - the determining the transmission power does not employ the power offset value.
18. The method of any of claims 11 to 17, wherein the one or more parameters of the CSI-RS indicate a periodicity of the CSI-RS.
19. The method of any of claims 11 to 18, wherein the one or more parameters of the CSI-RS indicate at least one of one or more CSI-RS subcarriers of resource elements or a CSI-RS sequence.
20. The method of any of claims 11 to 19, wherein when the one or more configuration parameters comprise one or more parameters of the CSI-RS, the transmitting the random access preamble uses at least one random access channel, wherein the one or more messages indicate:
 - an association between one or more synchronization signals and the CSI-RS; and
 - an association between the at least one random access channel and the one or more synchronization signals.
21. A method comprising:
 - receiving, by a wireless device, at least one radio resource control message comprising one or more configuration parameters of a cell;
 - receiving, by a wireless device, a control order for transmission of a random access preamble via the cell;
 - determining, for the random access preamble, a transmission power based on a pathloss measurement, wherein when the one or more configuration parameters comprises one or more parameters of a channel state information reference signal (CSI-RS) for the cell:
 - the pathloss measurement is based on the CSI-RS; and
 - the determining the transmission power employs a power offset value indicated by the one or more configuration parameters; and

transmitting the random access preamble based on the transmission power.

22. The method of claim 21, wherein the CSI-RS is a periodic CSI-RS.
23. The method of claim 21 or 22, wherein the one or more parameters of the CSI-RS indicate a periodicity of the CSI-RS.
24. The method of any of claims 21 to 23, wherein the one or more parameters of the CSI-RS indicate at least one of one or more CSI-RS subcarriers of resource elements or a CSI-RS sequence.
25. The method of any of claims 21 to 24, further comprising determining the transmission power for the random access preamble, wherein when the one or more configuration parameters do not comprise CSI-RS parameters for the cell:
 - the pathloss measurement is based on at least one synchronization signal; and
 - the determining the transmission power does not employ the power offset value.
26. The method of any of claims 21 to 25, wherein the one or more messages comprises at least one of a reference signal power value, a preamble base station received target power, or a configured wireless device transmit power for the cell.
27. The method of any of claims 21 to 26, wherein the determining the transmission power is further based on a reference signal power value.
28. The method of any of claims 21 to 27, wherein the transmission power employs a value of the pathloss measurement determined based on a received power of the CSI-RS.
29. The method of any of claims 21 to 28, wherein the transmission power is based on a sum of a preamble base station received target power and the value of the pathloss measurement.
30. The method of claim 29, wherein the value of the pathloss measurement is based on a reference signal power value minus a measured received power value of a reference signal, wherein:
 - when the one or more configuration parameters comprise one or more parameters of the CSI-RS for the cell: the reference signal is the CSI-RS; and
 - when the one or more configuration parameters do not comprise CSI-RS parameters for the cell: the reference signal is at least one synchronization signal.
31. The method of any of claims 21 to 30, wherein when the one or more configuration parameters comprise one or more parameters of the CSI-RS, the transmitting the random access preamble uses at least one random access channel, wherein the one or more messages indicate:
 - an association between one or more synchronization signals and the CSI-RS; and
 - an association between the at least one random access channel and the one or more synchronization signals.

32. A method comprising:
- receiving, by a wireless device, one or more messages indicating:
 - one or more configuration parameters of a periodic channel state information reference signal (CSI-RS) of a cell; and
 - a power offset value associated with the periodic CSI-RS of the cell;
 - receiving a control order for transmission of a random access preamble via the cell;
 - determining a transmission power for the random access preamble, wherein in response to the wireless device being configured with the periodic CSI-RS for the cell, the transmission power is at least based on the power offset value; and
 - transmitting, by the wireless device, the random access preamble using the transmission power.
33. The method of claim 32, wherein the one or more parameters of the CSI-RS indicate a periodicity of the CSI-RS.
34. The method of claim 32 or 33, wherein the one or more parameters of the CSI-RS indicate at least one of one or more CSI-RS subcarriers of resource elements or a CSI-RS sequence.
35. The method of any of claims 32 to 34, wherein the transmission power employs a value of a pathloss measurement determined based on a received power of the CSI-RS.
36. The method of claim 35, wherein the value of the pathloss measurement is based on a reference signal power value minus a measured received power value of a reference signal, wherein:
- when the one or more configuration parameters comprise one or more parameters of the CSI-RS for the cell: the reference signal is the CSI-RS; and
 - when the one or more configuration parameters do not comprise CSI-RS parameters for the cell: the reference signal is at least one synchronization signal.
37. The method of any of claims 32 to 36, further comprising determining the transmission power for the random access preamble, wherein in response to the wireless device being not configured with the periodic CSI-RS for the cell, the transmission power does not employ the power offset value.
38. The method of any of claims 32 to 37, wherein the one or more messages comprises at least one of a reference signal power value, a preamble base station received target power, or a configured wireless device transmit power for the cell.
39. The method of any of claims 32 to 38, wherein the determining the transmission power is further based on a reference signal power value.
40. The method of any of claims 32 to 39, wherein when the one or more configuration parameters comprise one or more parameters of the CSI-RS, the transmitting the random

access preamble uses at least one random access channel, wherein the one or more messages indicate:

an association between one or more synchronization signals and the CSI-RS; and

an association between the at least one random access channel and the one or more synchronization signals.

41. A method comprising:

determining a transmission power for a random access preamble based on a pathloss measurement, wherein the transmission power employs:

a power offset value in response to the pathloss measurement being based on a channel state information reference signal (CSI-RS); and

no power offset value in response to the pathloss measurement being based on at least one synchronization signal;

transmitting the random access preamble based on the transmission power.

42. The method of claim 41, wherein the CSI-RS is a periodic CSI-RS.

43. The method of claim 41 or 42, further comprising receiving, by the wireless device, one or more messages indicating:

one or more configuration parameters of the CSI-RS; and

a power offset value associated with the periodic CSI-RS of the cell;

44. The method of claim 43, wherein the one or more parameters of the CSI-RS indicate at least one of one or more CSI-RS subcarriers of resource elements or a CSI-RS sequence.

45. The method of any of claims 41 or 44, wherein the determining the transmission power is further based on a reference signal power value.

46. The method of any of claims 41 or 45, wherein the transmission power employs a value of the pathloss measurement based on:

a received power of the CSI-RS in response to the pathloss measurement being based on the CSI-RS; and

a received power of the at least one synchronization signal in response to the pathloss measurement being based on the at least one synchronization signal.

47. The method of claim 43, wherein the one or more messages further comprise at least one of a reference signal power value, a preamble base station received target power, or a configured wireless device transmit power for the cell.

48. The method of any of claims 41 to 47, wherein the transmission power is based on a sum of a preamble base station received target power and a value of the pathloss measurement.

49. The method of claim 48, wherein the value of the pathloss measurement is based on a reference signal power value minus a measured received power value of a reference signal, wherein:

when the one or more configuration parameters comprise one or more parameters of the CSI-RS for the cell: the reference signal is the CSI-RS; and

when the one or more configuration parameters do not comprise CSI-RS parameters for the cell: the reference signal is at least one synchronization signal.