UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VOLKSWAGEN GROUP OF AMERICA, INC.
Petitioner

v.

NEO WIRELESS, LLC
Patent Owner

Case IPR2022-01539
U.S. Patent No. 10,965,512

DECLARATION OF DR. PAUL MIN IN SUPPORT OF PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 10,965,512

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XII. GROUND 1: THE COMBINATION OF KIM AND TONG TEACHES CLAIMS 1-30. 42

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A. A POSA would have been motivated to combine Kim and Tong.....42

1. A POSA would have been motivated to implement beamforming in Kim's base station, as taught by Tong.....42
2. A POSA would have been motivated to use Kim's pilots for channel estimation, and to recover the transmitted data, as taught by Tong.....46

B. Independent Claim 1.....50

1. [1.P]: An orthogonal frequency division multiple access (OFDMA)-compatible base station that uses subcarriers in a frequency domain and time slots in a time domain, the OFDMA-compatible base station comprising:.....51
2. [1.1] a plurality of antennas; and a transmitter operably coupled to the plurality of antennas;.....52
3. [1.2] the transmitter configured to: insert first pilots of a first type onto a first plurality of subcarriers, wherein the first pilots are cell-specific pilots; and.....53
4. [1.3] insert data and second pilots of a second type onto a second plurality of subcarriers;.....57
5. [1.4] wherein at least some subcarriers of the first plurality of subcarriers or the second plurality of subcarriers are beam-formed; and.....61
6. [1.5] the plurality of antennas configured to transmit the first plurality of subcarriers and the second plurality of subcarriers in at least one of the time slots;.....63
7. [1.6] wherein the second type is different than the first type and wherein the first pilots do not interfere with the second pilots.66

C. Independent Claim 8.....67

1. [8.P] A method performed by an orthogonal frequency division multiple access (OFDMA)-compatible base station that uses subcarriers in a frequency domain and time slots in a time domain, the method comprising:.....67
2. [8.1] inserting, by the OFDMA-compatible base station, first pilots of a first type onto a first plurality of subcarriers, wherein the first pilots are cell-specific pilots;.....67

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3. [8.2] inserting, by the OFDMA-compatible base station, data and second pilots of a second type onto a second plurality of subcarriers; 67

4. [8.3] wherein at least some subcarriers of the first plurality of subcarriers or the second plurality of subcarriers are beam-formed; and.....68

5. [8.4] transmitting, by the OFDMA-compatible base station, the first plurality of subcarriers and the second plurality of subcarriers in at least one of the time slots using a plurality of antennas; 68

6. [8.5] wherein the second type is different than the first type and wherein the first pilots do not interfere with the second pilots.68

D. Independent Claim 15 68

1. [15.P] An orthogonal frequency division multiple access (OFDMA)-compatible mobile station that uses subcarriers in a frequency domain and time slots in a time domain, the OFDMA-compatible mobile station comprising: 68

2. [15.1] at least one antenna; and a receiver; and 69

3. [15.2] the at least one antenna and the receiver are configured to: receive first pilots of a first type on a first plurality of subcarriers, wherein the first pilots are cell-specific pilots; and 70

4. [15.3] receive second pilots of a second type and data on a second plurality of subcarriers, wherein the first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the time slots; 71

5. [15.4] wherein at least some subcarriers of the first plurality of subcarriers or the second plurality of subcarriers are beam-formed; and.....71

6. [15.5] the receiver is further configured to: recover the data using channel estimates from at least the second pilots; and ...72

7. [15.6] recover cell-specific information using the cell-specific pilots; 75

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8. [15.7] wherein the second type is different than the first type and wherein the first pilots do not interfere with the second pilots. 75

E. Independent Claim 23 75

1. [23.P] A method performed by an orthogonal frequency division multiple access (OFDMA)-compatible mobile station that uses subcarriers in a frequency domain and time slots in a time domain, the method comprising: 76
2. [23.1] receiving first pilots of a first type on a first plurality of subcarriers, wherein the first pilots are cell-specific pilots; 76
3. [23.2] receiving second pilots of a second type and data on a second plurality of subcarriers, wherein the first plurality of subcarriers and the second plurality of subcarriers are received in at least one of the time slots; 76
4. [23.3] wherein at least some subcarriers of the first plurality of subcarriers or the second plurality of subcarriers are beam-formed; 76
5. [23.4] recovering the data using channel estimates from at least the second pilots; and 76
6. [23.5] recovering cell-specific information using the cell-specific pilots; 77
7. [23.6] wherein the second type is different than the first type and wherein the first pilots do not interfere with the second pilots. 77

F. Claims 2, 9, 16, and 24 77

G. Claims 3, 10, 17, and 25 78

H. Claims 4, 11, 18, and 26 80

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