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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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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
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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
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 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 1568
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; and69
 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; and70
 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
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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
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