

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of: Joon Bae KIM	)	Group Art Unit:
Application No.:	)	Examiner:
Filed: Herewith	)	Confirmation No.:
Atty. File No.: 8365-87-PUS-CON	)	

For: METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A
WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313

PRELIMINARY AMENDMENT

Dear Madam:

Prior to the initial review of the above-identified patent application by the Examiner, please enter the following Preliminary Amendment. Although Applicants do not believe that any fees are due based upon the filing of this Preliminary Amendment, please charge any such fees to Deposit Account 19-1970.

Please amend the above-identified patent application as follows:

Amendments to the Specification begin on page 2 of this paper.

Amendments to the Abstract begin on page 3 of this paper.

Amendments to the Claims are shown in the listing of claims which begin on page 5 of this paper.

Remarks begin on page 12 of this paper.

AMENDMENTS TO THE SPECIFICATION

In the title:

Please change the title to read as follows:

A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS
OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS
HEADER
REPETITION IN PACKET-BASED OFDM SYSTEMS

Please amend the first paragraph of the application beneath the heading “RELATED APPLICATION DATA”:

[0001] This application is a continuation of U.S. Patent Application No. 13/376,856, filed February 8, 2012, which is a national stage application under 35 U.S.C. 371 of PCT Application No. PCT/US2010/046088, having an international filing date of August 20, 2010, which designated the United States, which PCT application claims the benefit of and priority under 35 U.S.C. §119(e) to U.S. Patent Application No. 61/235,909, filed August 21, 2009, entitled “Header Repetition Scheme in Packet-Based OFDM Systems,” each of which are incorporated herein by reference in their entirety.

AMENDMENTS TO THE ABSTRACT

Please amend the Abstract as follows:

~~An OFDM communication system is described that allows different values of D in a single domain where nodes are operating in different portions of frequency bands. For the power line medium, G.9960 has defined two overlapped baseband bandplans, 50MHz PB and 100MHz PB. In this exemplary scenario, the level of frequency diversity is different depending on the bandplan, hence providing different header decodability if D is fixed to 1. If D is fixed to 2, then it increases reliability for the narrowband devices, but may also unnecessarily increase overhead for the wide band devices. An exemplary aspect is therefore directed to techniques to accommodate different repetitions schemes ($D = 1, \dots, D_{MAX}$ and $H = 1, \dots, H_{MAX}$) in a single domain, and still allow devices to communicate with one another where D_{MAX} and H_{MAX} can be larger than 2.~~

Method and apparatus for use within a wireless OFDM network that transmits and receives first and second packets each having header bits and utilizing variable header repetition. The header bits in the first packet are communicated on multiple OFDM symbols and repeated on a plurality of OFDM subcarriers in a first frequency band. The header bits in a second packet are communicated on fewer OFDM symbols and in a second frequency band that overlaps with and is wider than the first frequency band.

ABSTRACT

Method and apparatus for use within a wireless OFDM network that transmits and receives first and second packets each having header bits and utilizing variable header repetition. The header bits in the first packet are communicated on multiple OFDM symbols and repeated on a plurality of OFDM subcarriers in a first frequency band. The header bits in a second packet are communicated on fewer OFDM symbols and in a second frequency band that overlaps with and is wider than the first frequency band.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1-59. (Cancelled)

60. (New) A wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver comprising:

a modulator operable to modulate a first number of OFDM symbols to transmit a first plurality of header bits in a first packet, wherein at least one header bit of the first plurality of header bits in the first packet is repeated on a plurality of OFDM subcarriers;

a wireless OFDM communications transmitter, connected to and in communication with the modulator, operable to transmit in a first narrower frequency band, the first packet comprising the first number of OFDM symbols;

the modulator further operable to modulate a second number of OFDM symbols to transmit a second plurality of header bits in a second packet, wherein the second number of OFDM symbols is less than the first number of OFDM symbols and wherein the second plurality of header bits is different than the first plurality of header bits; and

the wireless OFDM communications transmitter further operable to transmit in a second wider frequency band, the second packet comprising the second number of OFDM symbols,

wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

61. (New) The wireless transceiver of claim 60, wherein the at least one repeated header bit increases reliability of the first packet in the first, narrower frequency band.

62. (New) The wireless transceiver of claim 60, wherein the at least one repeated header bit provides diversity to increase a likelihood of correctly communicating header information of the first packet in the first, narrower frequency band.

63. (New) The wireless transceiver of claim 60, wherein the second wider frequency band is two times wider than the first narrower frequency band.

64. (New) The wireless transceiver of claim 60, wherein the second wider frequency band is four times wider than the first narrower frequency band.

65. (New) The wireless transceiver of claim 60, wherein the second wider frequency band is eight times wider than the first narrower frequency band.

66. (New) The wireless transceiver of claim 60, wherein a first OFDM symbol in the first packet contains different header bits than a second OFDM symbol in the first packet.

67. (New) The wireless transceiver of claim 60, wherein a first OFDM symbol in the first packet contains the first plurality of header bits and a second OFDM symbol in the first packet contains the first plurality of header bits.

68. (New) The wireless transceiver of claim 60, wherein the wireless transceiver supports SmartGrid applications.

69. (New) The wireless transceiver of claim 60, wherein the wireless transceiver supports one or more wireless standards.

70. (New) A wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver comprising:

a modulator operable to modulate a first number of OFDM symbols to transmit a first header portion of a first packet, wherein at least one header bit of the first header portion in the first packet is repeated on a plurality of OFDM subcarriers;

a wireless OFDM communications transmitter, connected to the modulator, operable to transmit the first packet in a first narrower frequency band, wherein the first packet comprises the first header portion transmitted on the first number of OFDM symbols;

the modulator further operable to modulate a second number of OFDM symbols to transmit a second header portion of a second packet; and

the wireless OFDM communications transmit further operable to transmit the second packet in a second wider frequency band, wherein the second number of OFDM symbols is less than the first number of OFDM symbols and wherein the second header portion is different than the first header portion,

wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

71. (New) The wireless transceiver of claim 70, wherein the at least one repeated header bit increases reliability of the first packet in the first, narrower frequency band.

72. (New) The wireless transceiver of claim 70, wherein the at least one repeated header bit provides diversity to increase a likelihood of correctly communicating header information of the first packet in the first, narrower frequency band.

73. (New) The wireless transceiver of claim 70, wherein the second wider frequency band is two times wider than the first narrower frequency band.

74. (New) The wireless transceiver of claim 70, wherein the second wider frequency band is four times wider than the first narrower frequency band.

75. (New) The wireless transceiver of claim 70, wherein the second wider frequency band is eight times wider than the first narrower frequency band.

76. (New) The wireless transceiver of claim 70, wherein a first OFDM symbol in the first packet contains different header bits than a second OFDM symbol in the first packet.

77. (New) The wireless transceiver of claim 70, wherein a first OFDM symbol in the first packet contains the first plurality of header bits and a second OFDM symbol in the first packet contains the first plurality of header bits.

78. (New) The wireless transceiver of claim 70, wherein the wireless transceiver supports SmartGrid applications.

79. (New) The wireless transceiver of claim 70, wherein the wireless transceiver supports one or more wireless standards.

80. (New) A method of operating a wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver comprising:

modulating, by a modulator, a first number of OFDM symbols to transmit a first plurality of header bits in a first packet, wherein at least one header bit of the first plurality of header bits in the first packet is repeated on a plurality of OFDM subcarriers;

transmitting, in a first narrower frequency band, by a transmitter using wireless OFDM communications, the transmitter connected to and in communication with the modulator, the first packet comprising the first number of OFDM symbols;

modulating, by the modulator, a second number of OFDM symbols to transmit a second plurality of header bits in a second packet, wherein the second number of OFDM symbols is less than the first number of OFDM symbols and wherein the second plurality of header bits is different than the first plurality of header bits; and

transmitting, in a second band wider frequency band, by the transmitter using wireless OFDM communications, the second packet comprising the second number of OFDM symbols,

wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

81. (New) The method of claim 80, wherein a first OFDM symbol of the first packet contains different header bits than a second OFDM symbol of the first packet.

82. (New) The method of claim 80, wherein a first OFDM symbol of the first packet contains the first plurality of header bits and a second OFDM symbol of the first packet contains the first plurality of header bits.

83. (New) The method of claim 80, wherein the wireless transceiver supports SmartGrid applications.

84. (New) The method of claim 80, wherein the wireless transceiver supports one or more wireless standards.

85. (New) The method of claim 80, wherein the second wider frequency band is two times wider than the first narrower frequency band.

86. (New) The method of claim 80, wherein the second wider frequency band is four times wider than the first narrower frequency band.

87. (New) The method of claim 80, wherein the second wider frequency band is eight times wider than the first narrower frequency band.

88. (New) The method of claim 80, the at least one repeated header bit increases reliability of the first packet in the first narrower frequency band.

89. (New) The method of claim 80, wherein the at least one repeated header bit provides diversity to increase a likelihood of correctly communicating header information of the first packet in the first, narrower frequency band.

90. (New) A method in a wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver comprising:

modulating, by a modulator, a first number of OFDM symbols to transmit a first header portion of a first packet, wherein at least one header bit of the first header portion in the first packet is repeated on a plurality of OFDM subcarriers;

transmitting, by a wireless OFDM communications transmitter, connected to the modulator, the first packet in a first narrower frequency band, wherein the first packet comprises the first header portion transmitted on the first number of OFDM symbols;

modulating, by the modulator, a second number of OFDM symbols to transmit a second header portion of a second packet; and

transmitting, by the wireless OFDM communications transmit, the second packet in a second wider frequency band, wherein the second number of OFDM symbols is less than the first number of OFDM symbols and wherein the second header portion is different than the first header portion,

wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

91. (New) The method of claim 90, wherein the at least one repeated header bit increases reliability of the first packet in the first narrower frequency band.

92. (New) The method of claim 90, wherein the at least one repeated header bit provides additional diversity to increase a likelihood of correctly communicating header information of the first packet in the first narrower frequency band.

93. (New) The method of claim 90, wherein the second wider frequency band is two times wider than the first narrower frequency band.

94. (New) The method of claim 90, wherein the second wider frequency band is four times wider than the first narrower frequency band.

95. (New) The method of claim 90, wherein the second wider frequency band is eight times wider than the first narrower frequency band.

96. (New) The method of claim 90, wherein a first OFDM symbol in the first packet contains different header bits than a second OFDM symbol in the first packet.

97. (New) The wireless method of claim 90, wherein a first OFDM symbol in the first packet contains the first plurality of header bits and a second OFDM symbol in the first packet contains the first plurality of header bits.

98. (New) The method of claim 90, wherein the wireless transceiver supports SmartGrid applications.

99. (New) The method of claim 90, wherein the wireless transceiver supports one or more wireless standards.

REMARKS/ARGUMENTS

By this amendment, claims 1-59 are canceled without prejudice or disclaimer and new claims 60-99 have been added.

Applicant requests examination on the merits.

Applicant believes that the pending claims are in condition for allowance and such disposition is respectfully requested. In the event that a telephone conversation would further prosecution and/or expedite allowance, the Examiner is invited to contact the undersigned.

The Commissioner is hereby authorized to charge to Deposit Account No. 19-1970 any fees under 37 C.F.R. §§ 1.16 and 1.17 that may be required by this paper and to credit any overpayment to that Account. If any extension of time is required in connection with the filing of this paper and has not been separately requested, such extension is hereby Petitioned.

Respectfully submitted,

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Date: November 14, 2016

HEADER REPETITION IN PACKET-BASED OFDM SYSTEMS

RELATED APPLICATION DATA

[0001] This application claims the benefit of and priority under 35 U.S.C. §119(e) to U.S. Patent Application No. 61/235,909, filed August 21, 2009, entitled “Header Repetition Scheme in Packet-Based OFDM Systems,” which is incorporated herein by reference in its entirety.

FIELD

[0002] An exemplary aspect of this invention relates to communications systems. More specifically, exemplary methods, systems, means, protocols and computer-readable storage media, are directed toward header repetition in a communications environment.

BACKGROUND

[0003] Conventional multi-user communications system use frame-based (or packet-based) transmission to communication between two or more users over a shared channel based on Orthogonal Frequency Division Multiplexing (OFDM) – (OFDM is also sometimes referred to as multicarrier modulation.) A packet is usually formed by a preamble, header, and payload, and transmitted using time-sharing or contention-based media access methods. An example of such a system includes IEEE 802.11 (Wireless LAN), IEEE 802.16 (WiMAX), and ITU G.9960 (G.hn). These systems use OFDM transmission, which is also sometimes referred to as Discrete Multi-Tone (DMT) which divides the transmission frequency band into multiple subcarriers (also referred to as tones or sub-channels), with each sub-carrier individually modulating a bit or a collection of bits.

[0004] The header contains important control information for the receiver to decode the payload properly, and also provides information about the packet length for virtual carrier sensing. Hence, it is essential to decode the header reliably. In G.9960, which is incorporated herein by reference in its entirety, and should be familiar to those skilled in the art, the header containing PHY_H bits (header information block) is carried over one or two OFDM symbols ($D = 1$ or 2), and within each symbol, multiple header information blocks are repeated over the entire frequency band. (See Editor for G.9960, “ITU-T

Recommendation G.9960: Next generation wire-line based home networking transceivers – Foundation,” ITU-T SG15/Q4, Jan. 2009) The default value of D is 1, but expanding it to 2 in some cases is under discussion. See, for example, “G.hn: PHY-Frame Header Extension,” ITU Temporary Document ITU-T SG-15/Q4 09CC-046, August 2009, and ITU Temporary Document ITU-T SG15/Q4 09XC-100 entitled “G.hn: Using Two Symbols for the Header of PHY Frame on Coax,” July, 2009, filed in the priority application and incorporated herein by reference in their entirety.

[0005] The possibility of carrying more than PHY_H bits in the header ($H = 1$ or 2) is also under discussion as disclosed in the “G.hn: PHY-Frame Header Extension” article and in “G.hn: Extended PHY Frame Header,” ITU-T SG15/Q4 09XC-119, July 2009, filed in the priority application and incorporated herein by reference in their entirety.

SUMMARY

[0006] One exemplary technique discussed herein is allowing different values of D in a single domain where nodes are operating in different portions of frequency bands. For the power-line medium, G.9960 has defined two overlapped baseband bandplans, 50MHz-PB and 100MHz-PB. The possibility of having narrower bandplans such as 25MHz-PB and 12.5MHz-PB are under discussion in order to support, for example, SmartGrid applications.

[0007] In this exemplary scenario, the level of frequency diversity is different depending on the bandplan, hence providing different header decodability if D is fixed to 1. If D is fixed to 2, then it increases reliability for the narrowband devices, but may also unnecessarily increase overhead for the wide-band devices.

[0008] An exemplary aspect is therefore directed to techniques to accommodate different repetitions schemes ($D = 1, \dots, D_{\text{MAX}}$ and $H = 1, \dots, H_{\text{MAX}}$) in a single domain, and still allow devices to communicate with one another. D_{MAX} and H_{MAX} can be 2 or larger than 2.

[0009] As illustrated in Fig. 1, various header repetition schemes are illustrated where D, H = 1 or 2. In Fig. 1, the second instance of a block with the same label is a copy of the prior block. The modulation of the copied block may not be exactly the same as the original version. For example, the label “Header Ext” emphasizes the fact that it may contain different header information than the “Header.” The payload after the header

may be omitted in some cases (e.g., ACK, RTS/CTS, etc.).

[0010] The repetition scheme expands similarly with larger values of D_{MAX} and H_{MAX} . An exemplary aspect focuses on dealing with different values of D , with different values of H capable of being supported in a straightforward way as discussed in the paper G.hn: PHY-Frame Header Extension.

[0011] On exemplary aspect is directed toward receiver detection of D with variable repetition. More specifically, in accordance with this exemplary embodiment, the transmitter selects (or determines), the at least one D value. The selection may be at its own discretion, or may be based on information communicated between one or more receivers, or based on instruction(s) from one or more other receivers and/or a domain master. Selection may depend on the number of available sub-carriers (or the bandwidth) of the bandplan the transmitter operates on and/or the receiver(s) operates on. In accordance with this exemplary embodiment, a receiving node in the domain should be able to decode packets sent by the transmitter without knowing D a priori (i.e. prior to decoding the packet header).

[0012] Another exemplary aspect is for a transmitter to carry, insert or otherwise communicate the value of D in the header so that all nodes know how many OFDM symbols are carrying header information. The receiver(s) starts processing the header by decoding one OFDM header symbol. If the receiver decodes it successfully, then the receiver knows how many more OFDM symbols ($D-1$) are carrying header information for a given frame. If the receiver fails to obtain the header information from the OFDM header symbol (i.e., the header decoding fails), then the receiver can try to decode two OFDM header symbols, and so on. The decoding of each additional OFDM header symbol provides additional diversity thereby increasing the likelihood of decoding the header information correctly.

[0013] Another exemplary aspect is directed to a fixed repetition scheme per domain. More specifically, a domain master can select (or determine) one or more fixed D values for at least one node in the domain. For example, the domain master may select one fixed value for all nodes in a domain. Selection may depend on the number of available sub-carriers (or the bandwidth) of the bandplans that the domain members operate on. The domain master may change the value of D dynamically. A node in the domain first needs to determine the D that the domain master has set (or

selected/determined).

[0014] On exemplary aspect is for the domain master to carry, insert or otherwise communicate the selected value of D in the header of the MAP frame while also using this D value for the transmission of the MAP header as described above. In this case, a node will be able to determine the value of D using the methods described above. After this value is determined by a node, the node can use this value until it is changed or updated by, for example, a domain master, another transceiver, etc.

[0015] Another exemplary aspect is for the domain master to carry, insert or otherwise communicate the selected value of D in the MAP while using a fixed D for the header of the MAP frame (e.g., pre-defined per medium or D_{MAX}). The D value in the MAP will be used for non-MAP frames/packets. In this case, a node in the domain may not need multiple levels of header decode process as described in above. Also in this exemplary method, the MAP may be sent with a different D value than the D value used for other (non-MAP) frames/packets.

[0016] Another exemplary aspect is directed toward a fixed repetition scheme per TXOP.

[0017] More specifically, in addition, or alternatively, the domain master may select (or determine) a D value per TXOP. This selection may be at its own discretion, or based on information communicated between one or more transceivers or receivers, or based on instruction from one or more transceivers or receivers. Selection may depend on the number of available sub-carriers (and/or the bandwidth) of the bandplan the transmitter/transceiver operates on and/or the receiver(s) operates on.

[0018] An exemplary technique is to include D in the TXOP descriptor transmitted in the MAP so that all nodes know in advance what value of D is used for that TXOP. The TXOP descriptor is the part of the MAP message which can be communicated via the MAP frame as discussed above.

[0019] Any of the above aspects and further aspects may be located in a network management system or network operation device that is located inside or outside the network and/or the transceiver(s). The network operation or management device that is located inside or outside the network may be managed and/or operated by a user, consumer, service provider or power utility provider, a governmental entity, or the like.

BRIEF DESCRIPTION ON THE DRAWINGS

[0020] The exemplary embodiments of the invention will be described in detail, with reference to the following figures, wherein:

[0021] Fig. 1 illustrates exemplary header repetition schemes;

[0022] Fig. 2 illustrates an exemplary transceiver;

[0023] Fig. 3 illustrates an exemplary communications environment;

[0024] Fig. 4 is a flowchart outlining an exemplary method of a header repetition scheme;

[0025] Fig. 5 is a flowchart outlining another exemplary method for a header repetition scheme;

[0026] Fig. 6 is a flowchart outlining yet another exemplary method for a header repetition scheme;

[0027] Fig. 7 is a flowchart outlining another exemplary method for a header repetition scheme; and

[0028] Fig. 8 is a flowchart outlining another method of an exemplary header repetition scheme.

DETAILED DESCRIPTION

[0029] The exemplary embodiments of this invention will be described in relation to communications systems, as well as protocols, techniques and methods for header repetition, such as in a DSL or multimode multicarrier communications environment, a home network or an access network, or in general any communications network operating using any communications protocol(s). Examples of such home or access networks include home powerline networks, access powerline networks, home coaxial cable network, access coaxial cable network, wireless home networks, wireless corporate networks, home telephone networks and access telephone networks. However, it should be appreciated that in general, the systems, methods, and techniques of this invention will work equally well for other types of communications environments, networks, and/or protocols.

[0030] The exemplary systems and methods of this invention will also be described in relation to wired or wireless modems and/or a software and/or a hardware testing module, a telecommunications test device, or the like, such as a DSL modem, an ADSL

modem, and xDSL modem, a VDSL modem, a line card, a G.hn transceiver, a MOCA transceiver, a Homeplug® transceiver, a power line modem, a wired or wireless modem, test equipment, a multicarrier transceiver, a wireless wide/local area network system, a satellite communications system, a network-based communications systems, such as an IP, Ethernet or ATM system, a modem equipped with diagnostic capabilities, or the like, or a separate programmed general purpose computer having a communications device that is capable of operating in conjunction with any one or more of the following communications protocols: MOCA, Homeplug, IEEE 802.11, IEEE 802.3, IEEE 802.16 (WiMAX), and ITU G.9960 (G.hn), or the like. However, to avoid unnecessarily obscuring the present invention, the following description omits well-known structures, operations and devices that may be shown in block diagram form or are otherwise summarized or known.

[0031] For purposes of explanation, numerous details are set forth in order to provide a thorough understanding of the present invention. It should be appreciated however that the present invention may be practiced in a variety of ways beyond the specific details set forth herein. Furthermore, while the exemplary embodiments illustrated herein show various components of this system collocated, it is to be appreciated that the various components of the system can be located at distant portions of a distributed network, such as a communications network, node, within a Domain Master, and/or the internet, or within a dedicated secured, unsecured, and/or encrypted system and/or within a network operation or management device that is located inside or outside the network. As an example, a Domain Master can also be used to refer to any device, system or module that manages and/or configures any one or more aspects of the network or communications environment.

[0032] Thus, it should be appreciated that the components of the system can be combined into one or more devices, or split between devices, such as a modem, a station, a Domain Master, a network operation or management device, a node or collocated on a particular node of a distributed network, such as a communications network. As will be appreciated from the following description, and for reasons of computational efficiency, the components of the system can be arranged at any location within a distributed network without affecting the operation thereof. For example, the various components can be located in a Domain Master, a node, a domain management

device, such as a MIB, a network operation or management device, or some combination thereof. Similarly, one or more of the functional portions of the system could be distributed between a modem and an associated computing device/system, and/or in a dedicated test and/or measurement device.

[0033] Furthermore, it should be appreciated that the various links 5, including the communications channel(s) connecting the elements can be wired or wireless links or any combination thereof, or any other known or later developed element(s) capable of supplying and/or communicating data to and from the connected elements. The term module as used herein can refer to any known or later developed hardware, software, firmware, or combination thereof, that is capable of performing the functionality associated with that element. The terms determine, calculate, and compute and variations thereof, as used herein are used interchangeably and include any type of methodology, process, technique, mathematical operational or protocol. The terms transceiver and modem are also used interchangeably herein. The terms transmitting modem and transmitting transceiver as well as receiving modem and receiving transceiver are also used interchangeably herein.

[0034] The term management interface is related to any type of interface between a management entity and/or technician and/or user and a transceiver, such as, a CO-MIB or CPE-MIB as described, for example, in ITU standard G.997.1, which is incorporated herein by reference in its entirety.

[0035] Moreover, while some of the exemplary embodiments described herein are directed toward a transmitter portion of a transceiver performing certain functions, this disclosure is intended to include corresponding receiver-side functionality in both the same transceiver and/or another transceiver, and vice versa.

[0036] Fig. 1 illustrates four different header configurations where $D, H = 1$ or 2 . Even more specifically, in the first example, $H=1$ and $D=1$ with a preamble followed by a header followed by a payload. In a second example $H=1$ and $D=2$, with the preamble followed by header 2 that is repeated as header 4, which is followed by the payload. As discussed, the repeated header can be repeated in full or in part. In the third example, $H=2$ and $D=1$, such that the preamble is followed by a header which is followed by an extended header and the payload. In the fourth example, $H=2$ and $D=2$ such that header 6 is repeated as header 8, and the extended header 3 is repeated as extended header 5,

which is followed by the payload. As discussed, the repeated portions may be exact duplicates.

[0037] As a more specific example, consider the header configuration in the fifth example. In the fifth example, H is again equal to 2 and D is equal to 2 such that header 11 is repeated as header 12, and the extended header 13 is repeated as extended header 14, which is followed by the payload. For this example, the “Header” is limited to a certain number of bits (here arbitrarily illustrated as 10 bits), however, for this example, there are 15 bits of information that need to be included in the header. Thus, 10 bits are included in the “Header” and the remaining 5 bits are included in the “Header Ext.” As will be appreciated, the number of information bits to be included in the header, the number of bits the header is capable of carrying and the number of bits the header extended is capable of carrying can be any value(s). The 10 bits in “Header” 11 are repeated in “Header” 12 and the 5 bits in “Header Ext” 13 and repeated in “Header Ext” 14.

[0038] Fig. 2 illustrates an exemplary transceiver or Domain Master 200. In addition to well known componentry, the transceiver or Domain Master 200 includes (for a Domain Master) a MAP determination module 210 and (for a transceiver) a MAP processing or relaying module 210, a header assembly module 220, modulation module 230, demodulation module 240, transmitter 250, encoding module 260, decoding module 270, receiver 280, and controller/processor 290. In general, a Domain Master generally determines a MAP frame for transmission to one or more other transceivers while a transceiver is capable of one or more of receiving and/or relaying the received MAP frame to one or more other transceivers. For ease of discussion, in the following description, the determining and transmitting of a MAP frame will be performed by a Domain Master-type of transceiver and the receiving and/or relaying of a MAP frame will be performed by a non-domain master type of transceiver. However, the description also allows and enables any transceiver (Domain master or non-domain master) to determine, transmit, receiver and/or relay MAP messages.

[0039] In operation, the transceiver or Domain Master 200, cooperating with the MAP determination module or MAP processing or relaying module 210, transmitter 250, and controller/processor 290 transmits a MAP frame that includes a TXOP descriptor. As discussed, this TXOP descriptor contains a bit field that indicates a value for an integer

(D) where the integer D indicates a number of header OFDM symbols that carry header bits. Next, the transceiver or Domain Master 200, cooperating with the header assembly module 220 and transmitter 250 prepares to transmit a second frame having a plurality of header bits using the D header OFDM symbols. Each OFDM symbol carries the plurality of header bits. Then, in cooperation with the modulation module 230, the transceiver or Domain Master 200 modulates the header bit onto the D OFDM symbols. As discussed, this modulation of the header bits onto the D OFDM symbols can occur where the header bits are modulated onto the D OFDM symbols in the same order or can occur where the header bits are modulated onto the D OFDM symbols in a different order. In addition, the encoding module 260 may encode the value of D into a bit field on the header of the second frame. The second frame is then transmitted over the communications channel.

[0040] As discussed, the value of D can be updated based, for example, on information received from another transceiver, on information received from a domain master, can be initiated by the controller/processor 290, or can in general be initiated and/or requested by any other device, wherein the value of D that is updated is different than the previous value of D. With the updated value of D, the above-described steps can be repeated utilizing this updated value of D.

[0041] In accordance with another exemplary operational embodiment, the transceiver or Domain Master 200 transmits a MAP frame that includes the TXOP descriptor and then receives a second frame that has a plurality of header bits that use the D header OFDM symbols. This is followed by the demodulation module 240 demodulating the header bits from the D OFDM symbols that were received. Additionally, the decoding module 270 may decode the value of D from a bit field in the header of the received second frame. As with the previous embodiment, the value of D can be updated with the above steps being repeated.

[0042] In accordance with yet another exemplary operational embodiment, the transceiver 200 first receives the MAP frame that includes the TXOP descriptor with the cooperation of the receiver 280. The transceiver 200, with the cooperation of the header assembly module 220, and transmitter 250, transmits a second frame having a plurality of header bits using the D header OFDM symbols. As with the previous embodiments, the header bits are modulated onto the D OFDM symbols either the same or in a

different order, and the value of D may be encoded in a bit field in the header of the second frame. Again, this can be followed by an updated value of D with the above steps being repeated.

[0043] In yet another exemplary operational embodiment, the transceiver 200 receives a MAP frame that includes the TXOP descriptor, which is followed by the receipt of a second frame that has a plurality of header bits that used the D header OFDM symbols. As with one of the above exemplary embodiments, this is done with the cooperation of the receiver 280, the demodulation module 240 and decoding module 270. Upon receipt, the header bits from the D OFDM symbols can be demodulated and the value of D from a bit field in the header of the second frame may be decoded.

[0044] Fig. 3 illustrates an exemplary communications environment that includes a first transceiver or domain master 310 and a second transceiver 320. While not illustrated in Fig. 3, there could be one or more additional transceivers that act as relays to pass the various informational messages and data exchanged between the transceivers to thereby facilitate communication between the first transceiver or domain master 310 and the second transceiver 320.

[0045] In operation, the transceiver and/or domain master 310, cooperating with the MAP determination module or MAP processing or relaying module 210, transmitter 250, and controller/processor 290 transmits a MAP frame that includes a TXOP descriptor over the communications channel to the second transceiver 320. As discussed, this TXOP descriptor contains a bit field that indicates a value for an integer (D) where the integer D indicates a number of header OFDM symbols that carry header bits. Next, the transceiver/domain master 310, cooperating with the header assembly module 220 and transmitter 250 prepares to transmit a second frame to transceiver 320 having a plurality of header bits using the D header OFDM symbols. Each OFDM symbol carries the plurality of header bits. Then, in cooperation with the modulation module 230, the transceiver/domain master 310 modulates the header bit onto the D OFDM symbols. As discussed, this modulation of the header bits onto the D OFDM symbols can occur where the header bits are modulated onto the D OFDM symbols in the same order or can occur where the header bits are modulated onto the D OFDM symbols in a different order. In addition, the encoding module 260 may encode the value of D into a bit field on the header of the second frame. The second frame is then transmitted over the

communications channel to the second transceiver 320.

[0046] As discussed, the value of D can be updated based, for example, on information received from another transceiver, on information received from a domain master, can be initiated by the controller/processor 290, or can in general be initiated and/or requested by any other device, wherein the value of D that is updated is different than a previous value of D. With the updated value of D, the above-described steps can be repeated utilizing this updated value of D.

[0047] In accordance with another exemplary operational embodiment, the transceiver/domain master 310 transmits a MAP frame that includes the TXOP descriptor to the second transceiver 320 and then receives from the second transceiver 320 a second frame that has a plurality of header bits that use the D header OFDM symbols. This is followed by the transceiver/domain master's 310 demodulation module 240 demodulating the header bits from the D OFDM symbols that were received. Additionally, the decoding module 270 of the transceiver/domain master 310 decodes the value of D from the bit in the header of the received second frame. As with the previous embodiment, the value of D can be updated with the above steps being repeated.

[0048] In accordance with yet another exemplary operational embodiment, the transceiver/domain master 310 first receives the MAP frame that includes the TXOP descriptor from the second transceiver 320 with the cooperation of the receiver 280 in the transceiver/domain master 310. The transceiver/domain master 310, with the cooperation of the header assembly module 220, and transmitter 250, transmits a second frame having a plurality of header bits using the D header OFDM symbols to the second transceiver 320. As with the previous embodiments, the header bits are modulated onto the D OFDM symbols either the same or in a different order, and the value of D encoded in a bit field in the header of the second frame. Again, this can be followed by an updated value of D with the above steps being repeated.

[0049] In yet another exemplary operational embodiment, the transceiver/domain master 310 receives a MAP frame from the transceiver 320 that includes the TXOP descriptor, which is followed by the receipt of a second frame that has a plurality of header bits that used the D header OFDM symbols. As with one of the above embodiments, this is done with the cooperation of the receiver 280, the demodulation

module 240 and decoding module 270. Upon receipt, the header bits from the D OFDM symbols can be demodulated and the value of D from a bit field in the header of the second frame decoded. Again, this can be followed by an updated value of D with the above steps being repeated.

[0050] Fig. 4 illustrates an exemplary method of packet transmission. In particular, control begins in step S400 and continues to step S410. In step S410, a MAP frame is transmitted, with the MAP frame including a TXOP descriptor. As discussed, the TXOP descriptor can contain a bit field that indicates a value for an integer (D) wherein the integer D indicates a number of header OFDM symbols that carry header bits. The TXOP descriptor could contain multiple bit fields that indicate more than a value for the integer D as well. Next, in step S420, a second frame is prepared for transmission, the second frame having a plurality of header bits using D header OFDM symbols. Then, in step S430, the value of D is encoded into a bit field in the header of the second frame. Control then continues to step S440.

[0051] In step S440, the header bits are modulated onto the D OFDM symbols in either the same order or in a different order. Then, in step S450, the second frame is transmitted with control continuing to step S460.

[0052] In step S460, the value of D can optionally be updated with steps S410-S450 being repeated. Control then continues to step S470 where the control sequence ends.

[0053] Fig. 5 illustrates an exemplary method of packet reception. In particular, control begins in step S500 and continues to step S510. In step S510, a MAP frame is received, with the MAP frame including a TXOP descriptor. As discussed, the TXOP descriptor contains a bit field that indicates a value for an integer (D) wherein the integer D indicates a number of header OFDM symbols that carry header bits. Next, in step S520, a second frame is received, the second frame having a plurality of header bits that used the D header OFDM symbols. Then, in step S530, the header bits are demodulated from the D OFDM symbols in the same order or in a different order. Control then continues to step S540.

[0054] In step S540, the value of D is decoded from a bit field in the header of the second frame. Then, in step S550, the value of D can optionally be updated with steps S510-S540 being repeated. Control then continues to step S560 where the control sequence ends.

[0055] Fig. 6 illustrates an exemplary method of packet communication. In particular, control begins in step S600 in a first transceiver or Domain Master and continues to step S610. In step S610, a MAP frame is transmitted to a second transceiver, with the MAP frame including a TXOP descriptor. For the second transceiver, control begins in step S602 and continues to step S604 where the MAP frame including the TXOP descriptor is received.

[0056] Next, in step S620, a second frame is prepared for transmission and transmitted to the second transceiver, the second frame having a plurality of header bits using D header OFDM symbols. As discussed the header bits are modulated onto the D OFDM symbols with the TXOP descriptor containing a bit field that indicates a value for a integer (D) wherein the integer D indicates a number of header OFDM symbols that carry header bits. The TXOP descriptor could contain multiple bit fields that indicate more than a value for the integer D as well. Additionally, the header bits can be modulated onto the D OFDM symbols in the same order or in a different order and the value of D encoded into a bit field in the header of the second frame. Control for the first transceiver then continues to step S630 where the control sequence ends.

[0057] In step S606, the second frame is received, the second frame having the plurality of header bits that used the D header OFDM symbols. Then, in step S608, the header bits are demodulated from the D OFDM symbols in the same order or in a different order with control continuing to step S612.

[0058] In step S612, the value of D is decoded from the bit field in the header of the second frame. Then, in step S612, the value of D can optionally be updated with steps S610, S620 and S604-S612 being repeated. Control then continues to step S616 where the control sequence ends.

[0059] Fig. 7 illustrates an exemplary method of packet communication. In particular, control begins in step S700 in a first transceiver or Domain Master and continues to step S710. In step S710, a MAP frame is transmitted to a second transceiver, with the MAP frame including a TXOP descriptor. Control then continues to step S720 where the control sequence ends.

[0060] For the second transceiver, control begins in step S702 and continues to step S704 where after receipt of the MAP frame that includes the TXOP descriptor, a second frame is prepared by the second transceiver for transmission, the second frame having a

plurality of header bits using D header OFDM symbols. Then, in step S706, the value of D is encoded into a bit field in the header of the second frame with control continuing to step S708.

[0061] In step S708, the header bits are modulated onto the D OFDM symbols in the same order or in a different order. Then, in step S712, the second frame is transmitted with control continuing to step S714.

[0062] In step S714, the value of D can optionally be updated with steps S710 and S704-S712 being repeated. Control then continues to step S716 where the control sequence ends.

[0063] Fig. 8 illustrates another exemplary method of packet communication. In particular, control begins in step S800 in a first transceiver or Domain Master and continues to step S810. In step S810, a MAP frame is transmitted to a second transceiver, optionally being relayed by one or more other transceivers, with the MAP frame including a TXOP descriptor. Control then continues to step S820 where the control sequence ends. The relaying of one or more of the MAP frame and second frame as discussed herein is not limited to this specific embodiment, but could also occur in any of the other embodiments disclosed herein.

[0064] For the second transceiver, control begins in step S802 and continues to step S804 where the MAP frame that includes the TXOP descriptor is received. Next, in step S806 a second frame is prepared by the second transceiver for transmission, the second frame having a plurality of header bits using D header OFDM symbols. Then, in step S808, the value of D is encoded into a bit field in the header of the second frame with control continuing to step S812.

[0065] In step S812, the header bits are modulated onto the D OFDM symbols in the same order or in a different order. Then, in step S814, the second frame is transmitted with control continuing to step S816.

[0066] In step S816, the value of D can optionally be updated with steps S810 and S804-S814 being repeated using the updated value of D. Control then continues to step S818 where the control sequence ends.

[0067] As used herein the terms network and domain have the same meaning and are used interchangeably. Also, the terms receiver, receiving node and receiving transceiver have the same meaning and are used interchangeably. Similarly, the terms

transmitter, transmitting node and transmitting transceiver have the same meaning and are used interchangeably. The terms transceiver and modem also have the same meaning and are used interchangeably. While the term home network has been used in this description, the description is not limited to home networks but in fact applies also to any network, such as enterprise networks, business networks, or any network with a plurality of connected nodes. The terms transceiver, node and modem have the same meaning and are used interchangeably in the description. The term frame and packet have the same meaning and are used interchangeably in the description. The term header and PHY-frame header have the same meaning and are used interchangeably in the description.

[0068] The terms network and home network have the same meaning and are used interchangeably in the description. While the term Home network has been used in this description, the description is not limited to home networks but in fact applies also to any network, such as enterprise networks, business networks, or any network with a plurality of connected nodes.

[0069] While the above-described methods and systems can be described with respect to a port (or endpoint) in a network, they can also be implemented in a dedicated module such as a test or network optimization module. This dedicated module could be plugged into the network and act as a Domain Master or with the cooperation of the Domain Master could initiate the various measurement techniques, gather the measurements from the port(s) in the network, analyze the measurements and use the measured information to detect and diagnose problems in the network and/or to optimize or improve the performance of a network.

[0070] While the above-described flowcharts have been discussed in relation to a particular sequence of events, it should be appreciated that one or more changes to this sequence can occur without materially effecting the operation of the embodiments. Additionally, the exact sequence of events need not occur as set forth in the exemplary embodiments. The exemplary techniques illustrated herein are not limited to the specifically illustrated embodiments but can also be utilized with the other exemplary embodiments and each described feature is individually and separately claimable. Moreover, the steps in the flowcharts are optional, with some of or all of the steps being performed.

[0071] The above-described methods and systems and can be implemented in a software module, a software and/or hardware testing module, a telecommunications test device, a DSL modem, an ADSL modem, an xDSL modem, a VDSL modem, a linecard, a G.hn transceiver, a MOCA transceiver, a Homeplug transceiver, a powerline modem, a wired or wireless modem, test equipment, a multicarrier transceiver, a wired and/or wireless wide/local area network system, a satellite communication system, network-based communication systems, such as an IP, Ethernet or ATM system, a modem equipped with diagnostic capabilities, or the like, or on a separate programmed general purpose computer having a communications device or in conjunction with any of the following communications protocols: CDSL, ADSL2, ADSL2+, VDSL1, VDSL2, HDSL, DSL Lite, IDSL, RADSL, SDSL, UDSL, MOCA, G.hn, Homeplug® or the like.

[0072] Additionally, the systems, methods and protocols of this invention can be implemented on a special purpose computer, a programmed microprocessor or microcontroller and peripheral integrated circuit element(s), an ASIC or other integrated circuit, a digital signal processor, a flashable device, a hard-wired electronic or logic circuit such as discrete element circuit, a programmable logic device such as PLD, PLA, FPGA, PAL, a modem, a transmitter/receiver, any comparable means, or the like. In general, any device (or one or more equivalent means) capable of implementing a state machine that is in turn capable of implementing the methodology illustrated herein can be used to implement the various communication/measurement methods, protocols and techniques according to this invention.

[0073] Furthermore, the disclosed methods may be readily implemented in software stored on a non-transitory computer-readable storage media using object or object-oriented software development environments that provide portable source code that can be used on a variety of computer or workstation platforms. Alternatively, the disclosed system may be implemented partially or fully in hardware using standard logic circuits or VLSI design. Whether software or hardware is used to implement the systems in accordance with this invention is dependent on the speed and/or efficiency requirements of the system, the particular function, and the particular software or hardware systems or microprocessor or microcomputer systems being utilized. The communication systems, methods and protocols illustrated herein can be readily implemented in hardware and/or software using any known or later developed systems

or structures, devices and/or software by those of ordinary skill in the applicable art from the functional description provided herein and with a general basic knowledge of the computer and telecommunications arts.

[0074] Moreover, the disclosed methods may be readily implemented in software that can be stored on a computer-readable storage medium, executed on programmed general-purpose computer with the cooperation of a controller and memory, a special purpose computer, a microprocessor, or the like. The systems and methods of this invention can be implemented as a program embedded on personal computer such as an applet, JAVA® or CGI script, as a resource residing on a server or computer workstation, as a routine embedded in a dedicated communication system or system component, or the like. The system can also be implemented by physically incorporating the system and/or method into a software and/or hardware system, such as the hardware and software systems of a test/modem device.

[0075] While the invention is described in terms of exemplary embodiments, it should be appreciated that any of the aspects of the invention described herein in connection with the exemplary embodiments could be separately and individually claimed and one or more of the features of the various embodiments can be combined with one or more features discussed in relation to one or more other embodiments.

[0076] While the exemplary embodiments illustrated herein discuss the various components collocated, it is to be appreciated that the various components of the system can be located a distant portions of a distributed network, such as a telecommunications network and/or the Internet or within a dedicated communications network. Thus, it should be appreciated that the components of the system can be combined into one or more devices or collocated on a particular node of a distributed network, such as a telecommunications network. As will be appreciated from the following description, and for reasons of computational efficiency, the components of the communications network can be arranged at any location within the distributed network without affecting the operation of the system.

[0077] It is therefore apparent that there has been provided, in accordance with the present invention, systems and methods for header repetition in OFDM systems. While this invention has been described in conjunction with a number of embodiments, it is evident that many alternatives, modifications and variations would be or are apparent to

those of ordinary skill in the applicable arts. Accordingly, it is intended to embrace all such alternatives, modifications, equivalents and variations that are within the spirit and scope of this invention.

Claims:

1. An OFDM communication method comprising:
transmitting or receiving a Media Access Plan (MAP) frame comprising a Transmission Opportunity (TXOP) descriptor, wherein the TXOP descriptor contains a bit field that indicates a value for an integer, D, wherein the integer D indicates a number of header OFDM symbols that carry header bits; and
transmitting or receiving a second frame having a plurality of header bits using D header OFDM symbols, wherein each OFDM header symbol carries the plurality of header bits.
2. The method of claim 1, further comprising modulating the header bits onto the D OFDM symbols
3. The method of claim 1, further comprising demodulating the header bits from the D OFDM symbols
4. The method of claim 1, further comprising modulating the header bits onto the D OFDM symbols, wherein the header bits are modulated onto the D OFDM symbols in the same order.
5. The method of claim 1, further comprising modulating the header bits onto the D OFDM symbols, wherein the header bits are modulated onto the D OFDM symbols in a different order.
6. The method of claim 1, further comprising demodulating the header bits from the D OFDM symbols, wherein the header bits were modulated onto the D OFDM symbols in a different order.
7. The method of claim 1, further comprising demodulating the header bits from the D OFDM symbols, wherein the header bits were modulated onto the D OFDM symbols in the same order.

8. The method of claim 1, further comprising encoding the value of D into a bit field in a header of the second frame.

9. The method of claim 1, further comprising decoding the value of D from a bit field in a header of the second frame.

10. The method of claim 1, wherein a header of the second frame comprises a bit field that indicates the value for D.

11. The method of claim 1, wherein the MAP frame is transmitted or received with a fixed value for D.

12. The method of claim 11, wherein the fixed value for D is equal to the maximum value for D.

13. The method of claim 1, wherein the plurality header bits of header bits in the D OFDM symbols are modulated or demodulated in the same order.

14. The method of claim 1, wherein the plurality header bits of header bits in the D OFDM symbols are modulated or demodulated in a different order.

15. The method of claim 1, wherein D can take on the values of 1 and 2.

16. The method of claim 1, wherein D can take on the values of 1 and 2 and a fixed value of D for the MAP frame is 2.

17. The method of claim 1, further comprising updating the value of D contained in the TXOP descriptor, wherein the updated value of D is different than the original value of D.

18. The method of claim 17, wherein one or more of the steps in claims 2-16 are repeated with the updated value of D.

19. An OFDM transceiver capable of transmitting or receiving a Media Access Plan (MAP) frame comprising a Transmission Opportunity (TXOP) descriptor, wherein the TXOP descriptor contains a bit field that indicates a value for an integer, D, wherein the integer D indicates a number of header OFDM symbols that carry header bits and transmitting or receiving a second frame having a plurality of header bits using D header OFDM symbols, wherein each OFDM header symbol carries the plurality of header bits.

20. An OFDM system comprising a first transceiver capable of transmitting or receiving a Media Access Plan (MAP) frame comprising a Transmission Opportunity (TXOP) descriptor, wherein the TXOP descriptor contains a bit field that indicates a value for an integer, D, wherein the integer D indicates a number of header OFDM symbols that carry header bits and a second transceiver capable of transmitting or receiving a second frame having a plurality of header bits using D header OFDM symbols, wherein each OFDM header symbol carries the plurality of header bits.

21. Claim 19 or 20, further comprising a modulation module capable of modulating the header bits onto the D OFDM symbols

22. Claim 19 or 20, further comprising a demodulation module capable of demodulating the header bits from the D OFDM symbols

23. Claim 19 or 20, further comprising a modulation module capable of modulating the header bits onto the D OFDM symbols, wherein the header bits are modulated onto the D OFDM symbols in the same order.

24. Claim 19 or 20, further comprising a modulation module capable of modulating the header bits onto the D OFDM symbols, wherein the header bits are modulated onto the D OFDM symbols in a different order.

25. Claim 19 or 20, further comprising a demodulation module capable of demodulating the header bits from the D OFDM symbols, wherein the header bits were modulated onto the D OFDM symbols in a different order.

26. Claim 19 or 20, further comprising a demodulation module capable of demodulating the header bits from the D OFDM symbols, wherein the header bits were modulated onto the D OFDM symbols in the same order.

27. Claim 19 or 20, wherein the value of D is encoded into a bit field in a header of the second frame.

28. Claim 19 or 20, wherein the value of D is decoded from a bit field in a header of the second frame.

29. Claim 19 or 20, wherein a header of the second frame comprises a bit field that indicates the value for D.

30. Claim 19 or 20, wherein the MAP frame is transmitted or received with a fixed value for D.

31. Claim 30, wherein the fixed value for D is equal to the maximum value for D.

32. Claim 19 or 20, wherein the plurality header bits of header bits in the D OFDM symbols are modulated or demodulated in the same order.

33. Claim 19 or 20, wherein the plurality header bits of header bits in the D OFDM symbols are modulated or demodulated in a different order.

34. Claim 19 or 20, wherein D can take on the values of 1 and 2.

35. Claim 19 or 20, wherein D can take on the values of 1 and 2 and a fixed value of D for the MAP frame is 2.

36. Claim 19 or 20, wherein the value of D contained in the TXOP descriptor is updated, wherein the updated value of D is different than the original value of D.

37. Claim 36, wherein one or more of the steps in claims 21-35 are repeated with the updated value of D.

38. An OFDM communication system comprising:
means for transmitting or receiving a Media Access Plan (MAP) frame comprising a Transmission Opportunity (TXOP) descriptor, wherein the TXOP descriptor contains a bit field that indicates a value for an integer, D, wherein the integer D indicates a number of header OFDM symbols that carry header bits; and
means for transmitting or receiving a second frame having a plurality of header bits using D header OFDM symbols, wherein each OFDM header symbol carries the plurality of header bits.

39. The system of claim 38, further comprising means for modulating the header bits onto the D OFDM symbols

40. The system of claim 38, further comprising means for demodulating the header bits from the D OFDM symbols

41. The system of claim 38, further comprising means for modulating the header bits onto the D OFDM symbols, wherein the header bits are modulated onto the D OFDM symbols in the same order.

42. The system of claim 38, further comprising means for modulating the header bits onto the D OFDM symbols, wherein the header bits are modulated onto the D OFDM symbols in a different order.

43. The system of claim 38, further comprising means for demodulating the header bits from the D OFDM symbols, wherein the header bits were modulated onto the D OFDM symbols in a different order.

44. The system of claim 38, further comprising means for demodulating the header bits from the D OFDM symbols, wherein the header bits were modulated onto the D OFDM symbols in the same order.

45. The system of claim 38, further comprising means for encoding the value of D into a bit field in a header of the second frame.

46. The system of claim 38, further comprising means for decoding the value of D from a bit field in a header of the second frame.

47. The system of claim 38, wherein a header of the second frame comprises a bit field that indicates the value for D.

48. The system of claim 38, wherein the MAP frame is transmitted or received with a fixed value for D.

49. The system of claim 48, wherein the fixed value for D is equal to the maximum value for D.

50. The system of claim 38, wherein the plurality header bits of header bits in the D OFDM symbols are modulated or demodulated in the same order.

51. The system of claim 38, wherein the plurality header bits of header bits in the D OFDM symbols are modulated or demodulated in a different order.

52. The system of claim 38, wherein D can take on the values of 1 and 2.

53. The system of claim 38, wherein D can take on the values of 1 and 2 and a fixed value of D for the MAP frame is 2.

54. The system of claim 38, further comprising means for updating the value of D contained in the TXOP descriptor, wherein the updated value of D is different than the original value of D.

55. The system of claim 54, wherein one or more of the steps in claims 39-53 are repeated with the updated value of D.

56. A non-transitory computer-readable information storage media having processor-executable instructions stored thereon that, if executed by a processor, are capable of performing the steps in any one or more of claims 1-18.

57. Claim 19, wherein the OFDM transceiver is a domain master.

58. Claim 20, wherein the first transceiver is a domain master.

59. Any one or more of the features as described herein.

ABSTRACT

An OFDM communication system is described that allows different values of D in a single domain where nodes are operating in different portions of frequency bands. For the power-line medium, G.9960 has defined two overlapped baseband bandplans, 50MHz-PB and 100MHz-PB. In this exemplary scenario, the level of frequency diversity is different depending on the bandplan, hence providing different header decodibility if D is fixed to 1. If D is fixed to 2, then it increases reliability for the narrowband devices, but may also unnecessarily increase overhead for the wide-band devices. An exemplary aspect is therefore directed to techniques to accommodate different repetitions schemes ($D = 1, \dots, D_{\text{MAX}}$ and $H = 1, \dots, H_{\text{MAX}}$) in a single domain, and still allow devices to communicate with one another where D_{MAX} and H_{MAX} can be larger than 2.

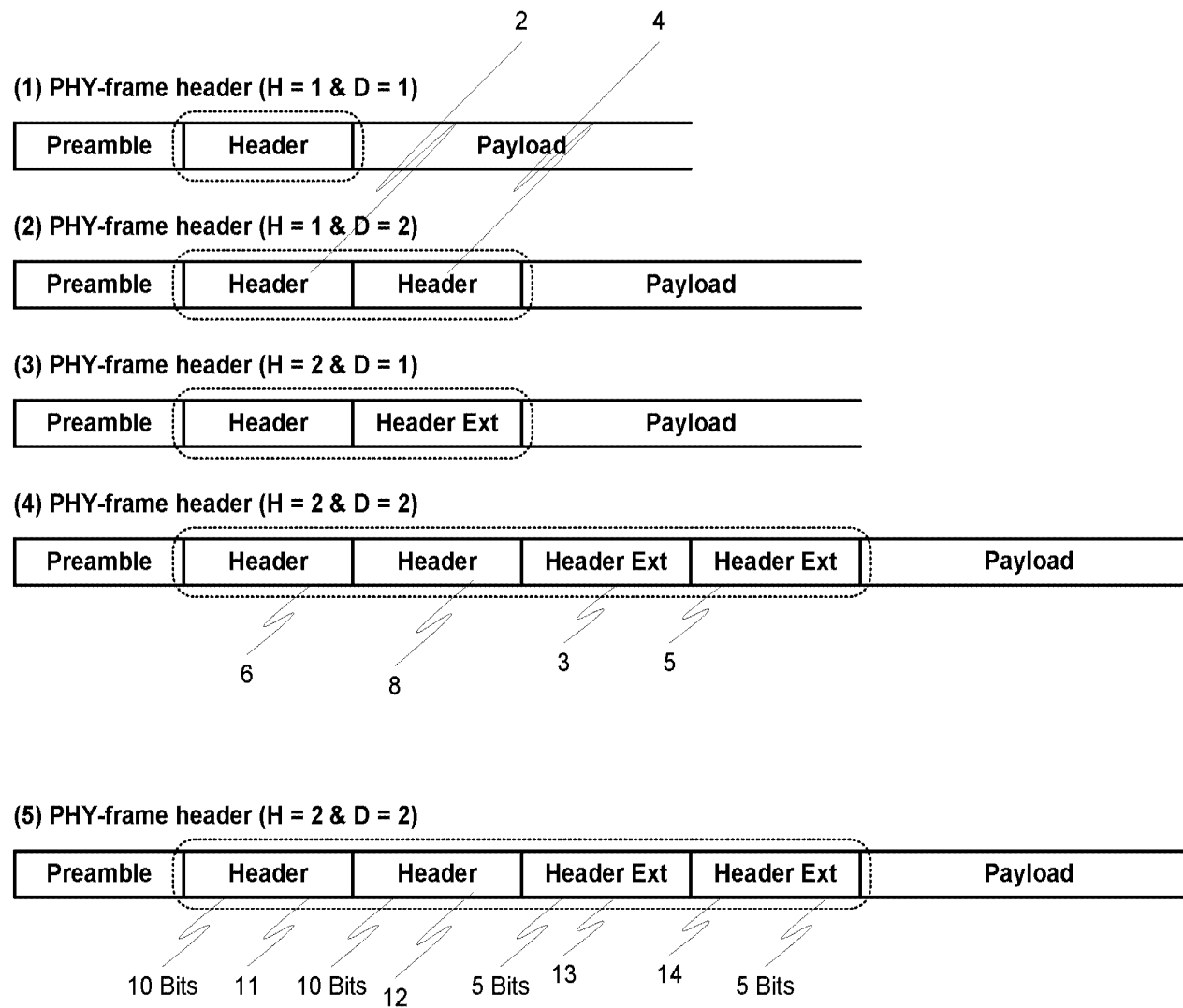


Fig. 1

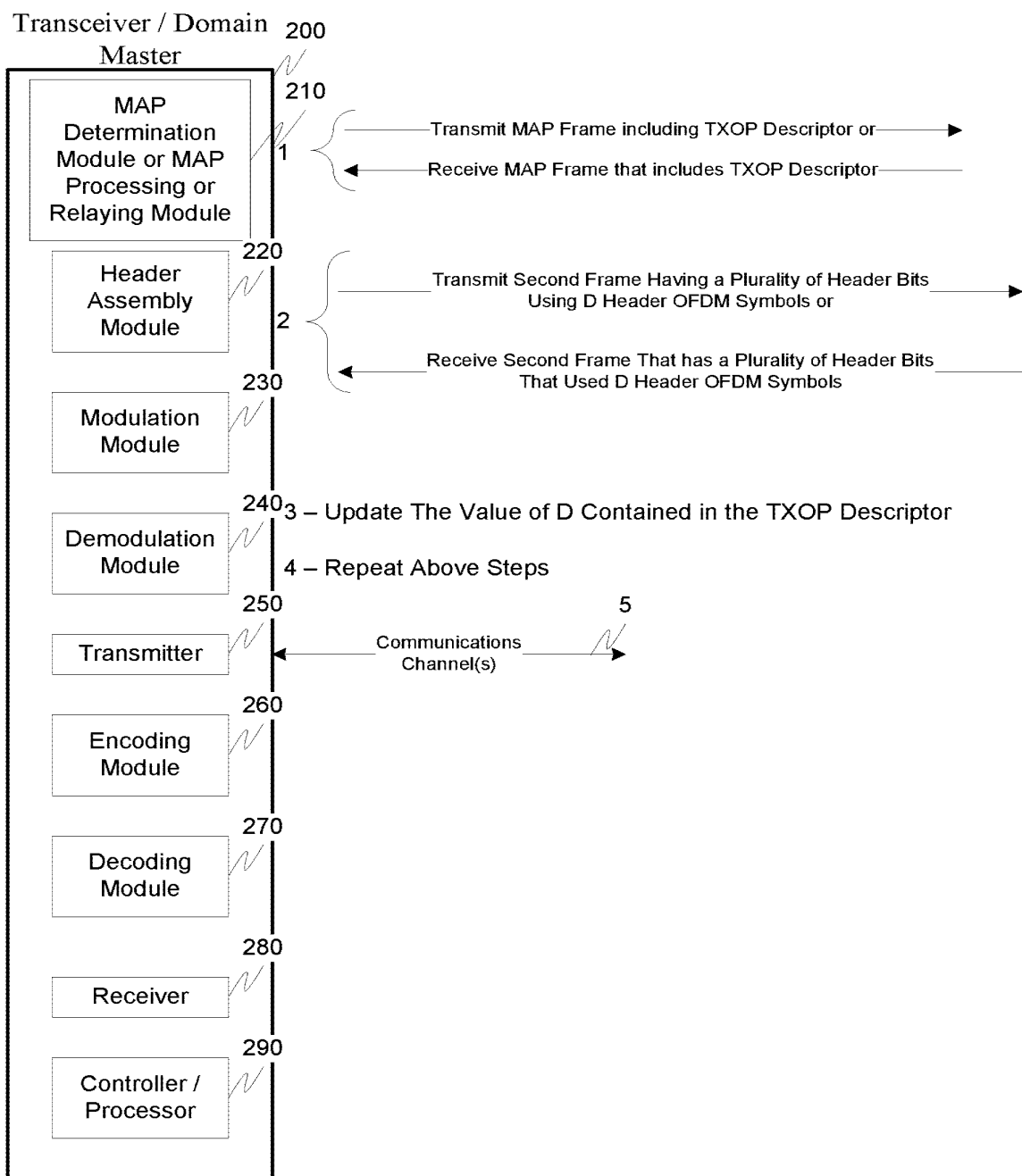


Fig. 2

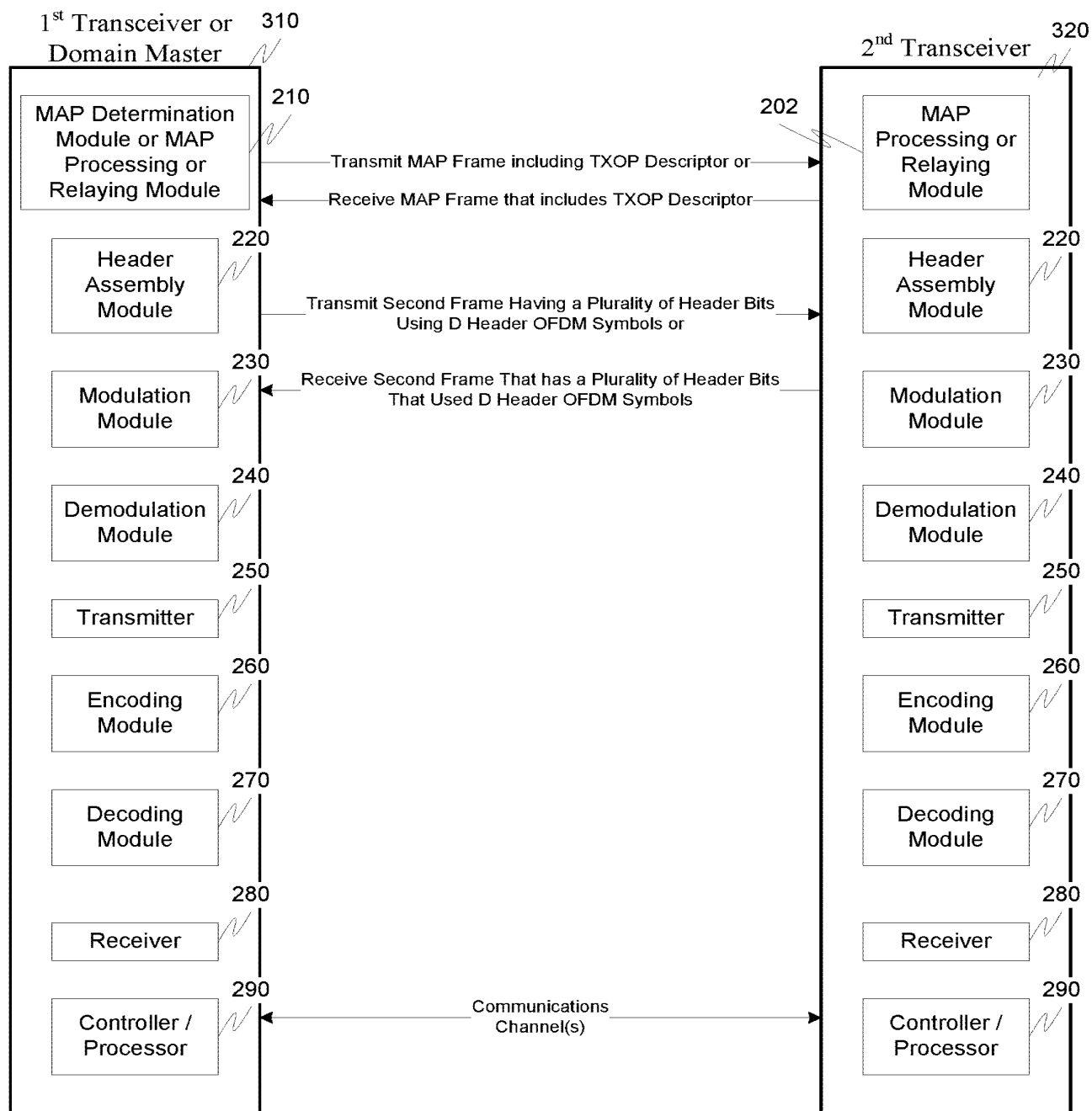


Fig. 3

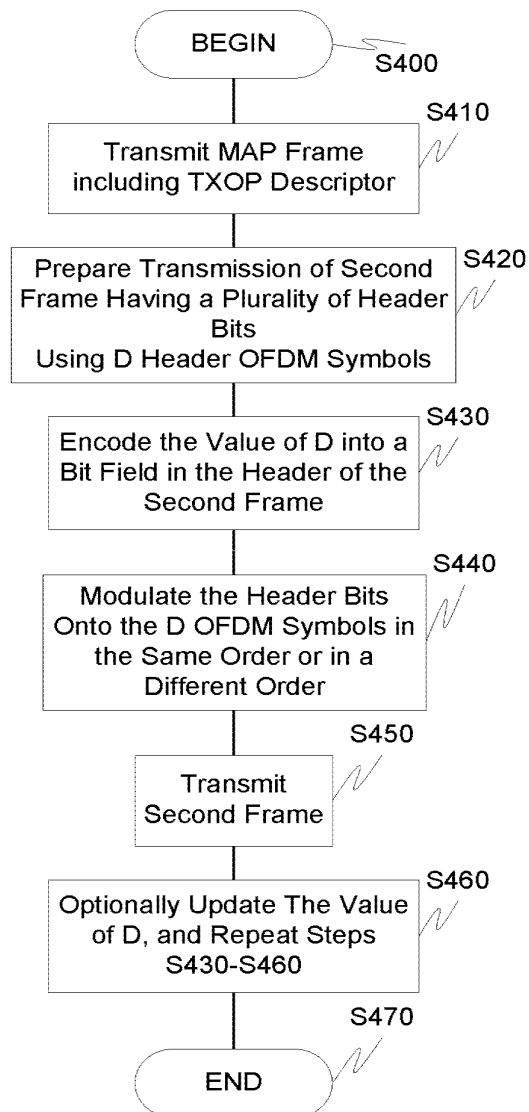


Fig. 4

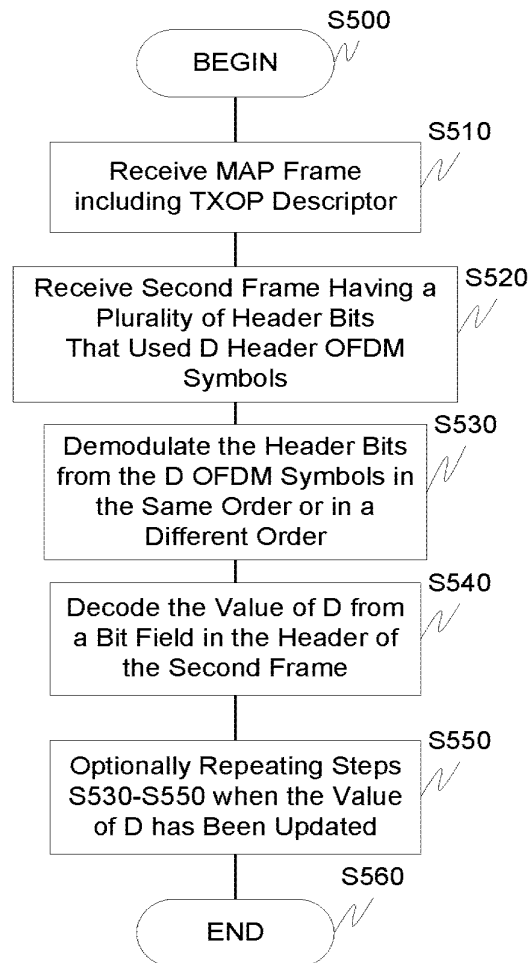


Fig. 5

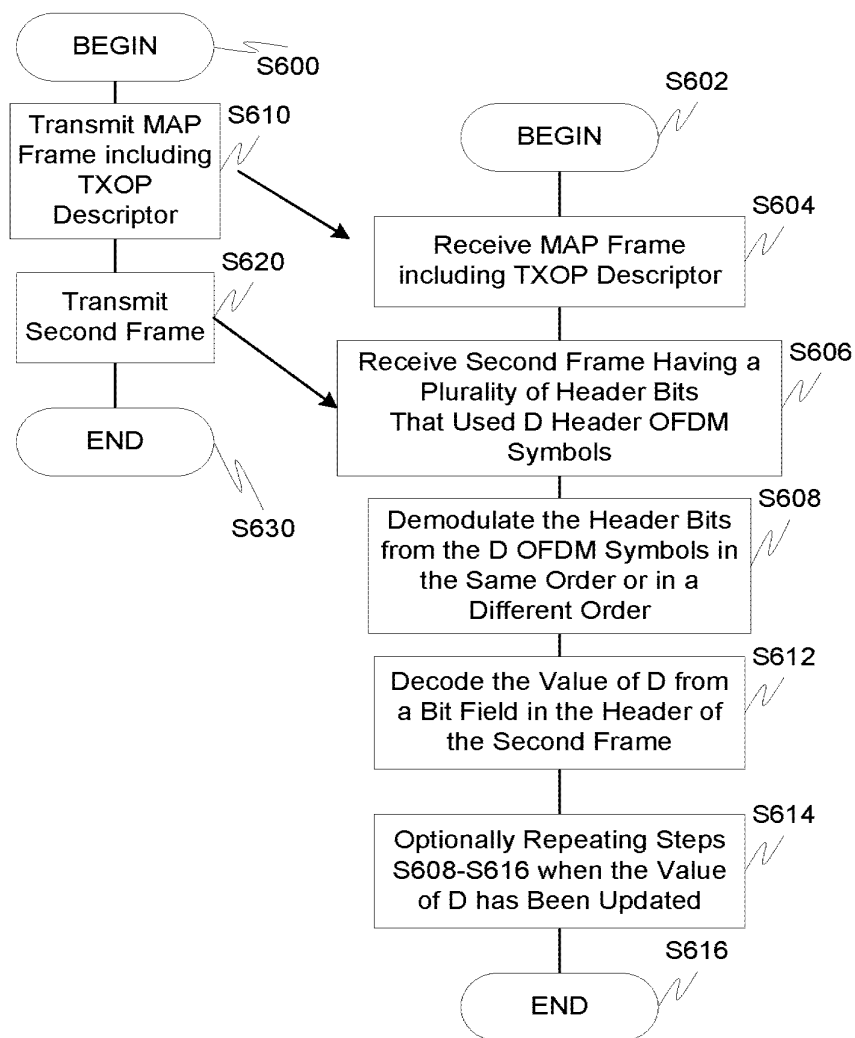


Fig. 6

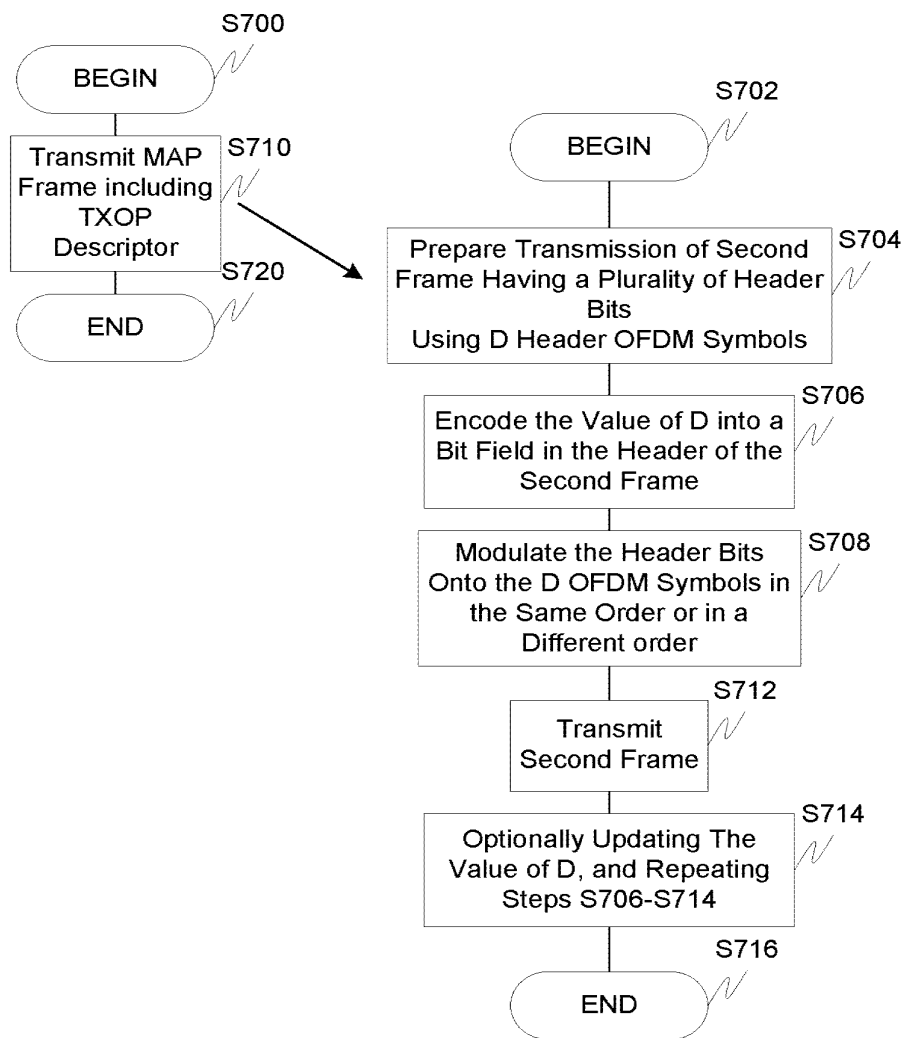


Fig. 7

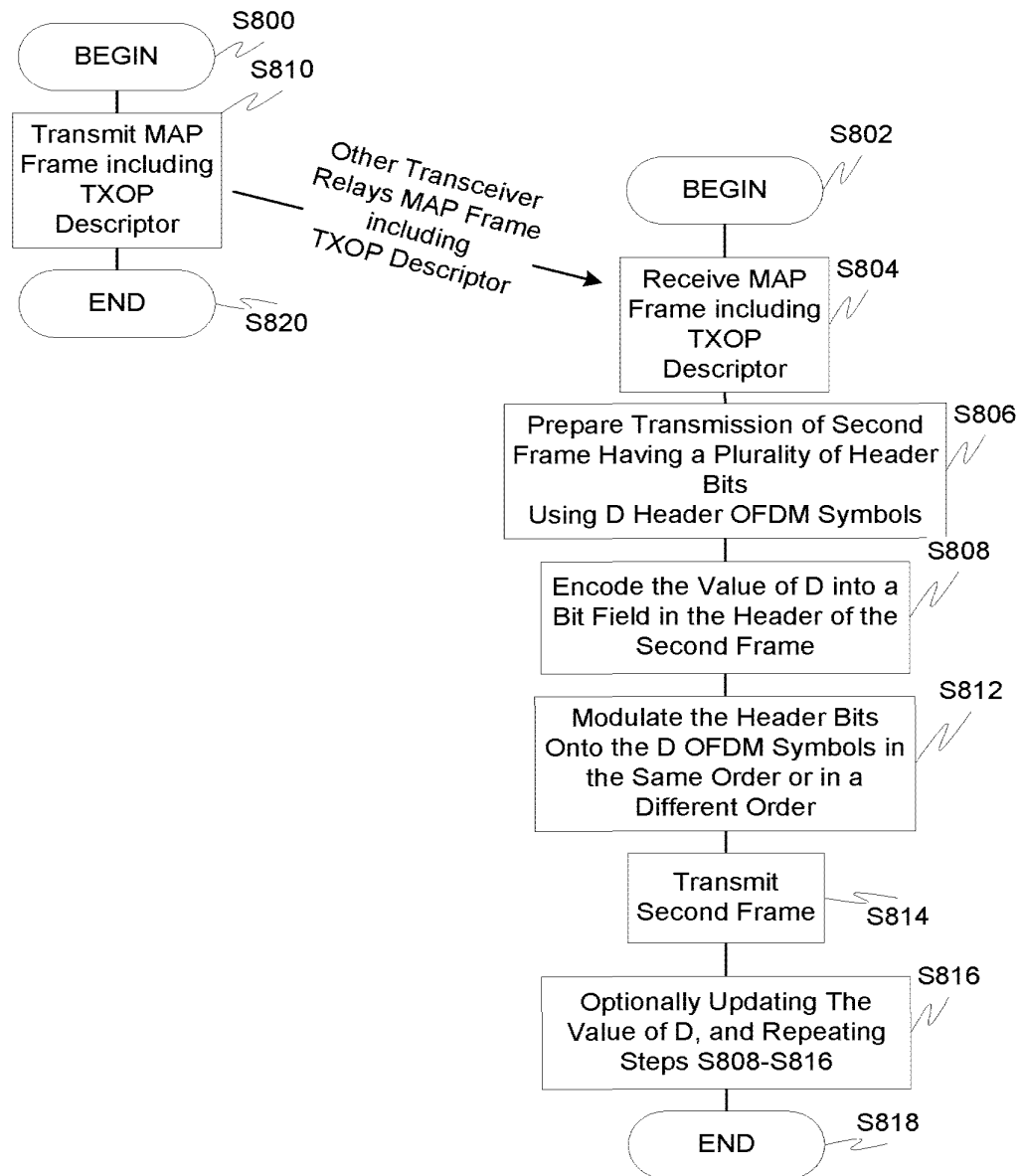


Fig. 8

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		
First Named Inventor/Applicant Name:		Jonn Bae KIM		
Filer:		Jason Vick/Joanne Vos		
Attorney Docket Number:		8365-87-PUS-CON		
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Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY APPLICATION FILING	1011	1	280	280
UTILITY SEARCH FEE	1111	1	600	600
UTILITY EXAMINATION FEE	1311	1	720	720
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	1202	20	80	1600
INDEPENDENT CLAIMS IN EXCESS OF 3	1201	1	420	420
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				3620

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Title of Invention:	METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS
First Named Inventor/Applicant Name:	Jonh Bae KIM
Customer Number:	62574
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Payment information:

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Payment Type	DA
Payment was successfully received in RAM	\$3620
RAM confirmation Number	111516INTEFSW00000322191970
Deposit Account	191970
Authorized User	Joanne Vos

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37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)
37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	ADS.pdf	1823312	no	9
			7502122b8f5af0bac656a508a1f965c4c9327925		
Warnings:					
Information:					
2	Oath or Declaration filed	Executed_Declaration.pdf	410903	no	2
			cd1e011c1757cc41b01f424a0b7be78e13c7800c		
Warnings:					
Information:					
3		AMEND_PRELIM_01.pdf	106572	yes	12
			1c8357abb51a135545522ce1567a3ce022e184cb		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Preliminary Amendment		1	1	
	Specification		2	2	
	Abstract		3	4	
	Claims		5	11	
	Applicant Arguments/Remarks Made in an Amendment		12	12	
Warnings:					
Information:					
4		Specification_FINAL.pdf	137358	yes	26
			f70bb17431b028e3af610e56689d26b6b39a1c11		

Multipart Description/PDF files in .zip description					
Document Description			Start	End	
Specification			1	18	
Claims			19	25	
Abstract			26	26	
Warnings:					
Information:					
5	Drawings-only black and white line drawings	Figures.pdf	129228	no	8
			01df6e5c3fe2a9d2f590a62e64a7df9864b3d8dd		
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	38305	no	2
			0fe386ffea138b95a23d415e5a1cc9b5b83a68e3		
Warnings:					
Information:					
Total Files Size (in bytes):			2645678		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	8365-87-PUS-CON
		Application Number	
Title of Invention	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		
<p>The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.</p> <p>This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.</p>			

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor	1				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Joon	Bae	KIM		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Lexington	State/Province	MA	Country of Residence	US

Mailing Address of Inventor:

Address 1	14 Pine Knoll Road				
Address 2					
City	Lexington	State/Province	MA		
Postal Code	02420	Country	US		

Inventor	2				Remove
Legal Name					
Prefix	Given Name	Middle Name	Family Name	Suffix	
	Marcos	C.	TZANNES		
Residence Information (Select One) ☒ US Residency ☐ Non US Residency ☐ Active US Military Service					
City	Petaluma	State/Province	CA	Country of Residence	US

Mailing Address of Inventor:

Address 1	1943 Castle Dr.				
Address 2					
City	Petaluma	State/Province	CA		
Postal Code	94954	Country	US		

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.

Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	8365-87-PUS-CON
		Application Number	
Title of Invention	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		

☐ An Address is being provided for the correspondence information of this application.

Customer Number	62574		
Email Address	ivick@sheridanross.com	Add Email	Remove Email

Application Information:

Title of the Invention	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		
Attorney Docket Number	8365-87-PUS-CON	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	8	Suggested Figure for Publication (if any)	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	62574		

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	8365-87-PUS-CON
		Application Number	
Title of Invention	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	13/376856	2012-02-08
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13/376856	a 371 of international	PCT/US2010/046088	2010-08-20
Prior Application Status	Expired	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/US2010/046088	Claims benefit of provisional	61/235909	2009-08-21
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	8365-87-PUS-CON
		Application Number	
Title of Invention	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	8365-87-PUS-CON
		Application Number	
Title of Invention	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	8365-87-PUS-CON
		Application Number	
Title of Invention	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant	1		<input type="button" value="Remove"/>
<p>If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.</p>			
<input type="button" value="Clear"/>			
☒ Assignee	Legal Representative under 35 U.S.C. 117		Joint Inventor
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest	
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
<div style="border: 1px solid black; height: 20px; width: 100%;"></div>			
Name of the Deceased or Legally Incapacitated Inventor: <div style="border: 1px solid black; width: 450px; height: 20px;"></div>			
If the Applicant is an Organization check here. ☒			
Organization Name	APPLIED TRANSFORM, LLC		
Mailing Address Information For Applicant:			
Address 1	101 GREAT ROAD		
Address 2	SUITE 217		
City	BEDFORD	State/Province	MA
Country	US	Postal Code	01730
Phone Number		Fax Number	
Email Address			
Additional Applicant Data may be generated within this form by selecting the Add button. <input type="button" value="Add"/>			

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	8365-87-PUS-CON
		Application Number	
Title of Invention	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		

Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
Remove				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1		<input type="text"/>		
Address 2		<input type="text"/>		
City	<input type="text"/>	State/Province	<input type="text"/>	
Country ⁱ	<input type="text"/>	Postal Code	<input type="text"/>	
Phone Number	<input type="text"/>	Fax Number	<input type="text"/>	
Email Address	<input type="text"/>			
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add				

Signature:					Remove
NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).					
This Application Data Sheet must be signed by a patent practitioner if one or more of the applicants is a juristic entity (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, all joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of all joint inventor-applicants.					
See 37 CFR 1.4(d) for the manner of making signatures and certifications.					
Signature	/Jason H. Vick/			Date (YYYY-MM-DD)	2016-11-14
First Name	Jason H.	Last Name	Vick	Registration Number	45285
Additional Signature may be generated within this form by selecting the Add button. Add					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	8365-87-PUS-CON
		Application Number	
Title of Invention	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of
Invention

HEADER REPETITION IN PACKET-BASED OFDM SYSTEMS

As the below named inventor, I hereby declare that:

This declaration
is directed to:



The attached application, or



United States application or PCT international application number _____

filed on _____

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

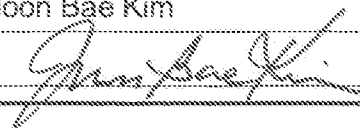
WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Joon Bae Kim

Date (Optional): 5/4/16

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)****Title of
Invention****HEADER REPETITION IN PACKET-BASED OFDM SYSTEMS**

As the below named inventor, I hereby declare that:

This declaration ☒ The attached application, or
is directed to:☐ United States application or PCT international application number _____
filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001
by fine or imprisonment of not more than five (5) years, or both.**WARNING:**

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTORInventor: Marcos C. Tzannes

Date (Optional) : _____

Signature: 

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Substitute for form 1449A/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	15/350,418
				Filing Date	November 14, 2016
				First Named Inventor	Joon Bae KIM
				Art Unit	
				Examiner Name	
Sheet	1	of	3	Attorney Docket Number	8365-87-PUS-CON

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	Document Number Number-kind Code ^{2 (if known)}	Publication Date MM-DD-YYYY	Name of Patentee of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	2003/0072255	04-17-2003	Ma et al.	
	2	2004/0179517	09-16-2004	Yamamoto et al.	
	3	2005/0135318	06-23-2005	Walton et al.	
	4	2005/0135284	06-23-2005	Nanda et al.	
	5	2005/0169261	08-04-2005	Williams et al.	
	6	2008/0219229	09-11-2008	Zheng	
	7	2009/0086646	04-02-2009	Kuchibhotla et al.	
	8	2009/0290563	11-26-2009	Gu et al.	
	9	2010/0085964	04-08-2010	Weir et al.	
	10	2010/0158046	06-24-2010	Pu	
	11	2010/0208594	08-19-2010	Kwon et al.	
	12	2010/0260137	10-14-2010	Vrzic et al.	
	13	2012/0170625	07-05-2012	Kim et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Foreign Patent Document Country Code ³ ; Number ⁴ ; Kind Code ⁵ (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
	14	EP 1392025	02-25-2004	Kabushiki Kaisha Toyota Jidoshokki Kariya-Shi		
	15	WO 2007/127311	11-08-2007	Interdigital Technology Corporation		

OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)		
Examiner Initials*	Cite No. ¹	
	16	"IEEE 802.3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications" December 2008; 2977 pages

Examiner Signature		Date Considered	
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute for form 1449A/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	15/350,418
				Filing Date	November 14, 2016
				First Named Inventor	Joon Bae KIM
				Art Unit	
				Examiner Name	
Sheet	2	of	3	Attorney Docket Number	8365-87-PUS-CON

17	"IEEE 802.11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications" June 2007; 1233 pages
18	"IEEE 802.16: Air Interface for Fixed Broadband Wireless Access Systems" October 2004; 895 pages.
19	"ITU G.9960: Unified High-Speed Wire-Line Based Home Networking Transceivers - Foundation" October 2009; 112 pages
20	"ITU Standard G.997.1: Physical Layer Management for Digital Subscriber Line (DSL) Transceivers" April 2009; 128 pages
21	Aware, Inc., "G.hn: PHY-Frame Header Extension," ITU-T SG15/Q4 09CC-046, Concord, California, Aug. 2009
22	CopperGate Communications, "G.hn: Using Two Symbols for the Header of a PHY frame on Coax," ITU-T SG15/Q4 09XC-100, Xian, China, Jul. 2009.
23	Editor for G.9960, "ITU-T Recommendation G.9960: Next generation wire-line based home networking transceivers -- Foundation," ITU-T SG15/Q4, Jan. 2009.
24	Intellon, Corporation, "G.hn: Extended PHY frame header," ITU-T SG15/Q4 09XC-119, Xian, China, Jul. 2009
25	OKSMAN, et al. "G.hn: The New ITU-T Home Networking Standard" IEEE Communications Magazine, IEEE Service Center, Piscataway, US, Vol 47, No. 10, October 1, 2009, pages 138-145 XP011283328
26	International Search Report for International (PCT) Application No. PCT/US2010/046088, mailed Dec. 22, 2010 (Attorney Ref. No.: 8365-87-PCT)
27	Written Opinion for International (PCT) Application No. PCT/US2010/046088, mailed Dec. 22, 2010 (Attorney Ref. No.: 8365-87-PCT)
28	International Preliminary Report on Patentability for International (PCT) Application No. PCT/US2010/046088, mailed March 1, 2012 (Attorney Ref. No.: 8365-87-PCT)
29	Official Action (including translation) for Chinese Patent Application No. 201080037081.2, mailed December 4, 2013 (Attorney Ref. No.: 8365-87-PCN)
30	Official Action (including translation) for Chinese Patent Application No. 201080037081.2, mailed July 3, 2014 (Attorney Ref. No.: 8365-87-PCN)
31	Official Action (including translation) for Chinese Patent Application No. 201080037081.2, mailed March 23, 2015 (Attorney Ref. No.: 8365-87-PCN)
32	Notification to Grant the Patent (including translation) for Chinese Patent Application No. 201080037081.2, mailed Oct. 26, 2015 (Attorney Ref. No.: 8365-87-PCN)

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute for form 1449A/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	15/350,418
				Filing Date	November 14, 2016
				First Named Inventor	Joon Bae KIM
				Art Unit	
				Examiner Name	
Sheet	3	of	3	Attorney Docket Number	8365-87-PUS-CON

	33	Communication Pursuant to Rules 161(1) and 162 EPC for European Patent Application No. 10748023.8, mailed April 18, 2012 (Attorney Ref. No.: 8365-87-PEP)
	34	Office Action for European Patent Application No. 10748023.8, mailed Feb. 17, 2015 (Attorney Ref. No.: 8365-87-PEP)
	35	Office Action for U.S. Patent Application No. 13/376,856, mailed June 17, 2014 (Attorney Ref. No.: 8365-87-PUS)
	36	Office Action for U.S. Patent Application No. 13/376,856, mailed Feb. 24, 2015 (Attorney Ref. No.: 8365-87-PUS)
	37	Office Action for U.S. Patent Application No. 13/376,856, mailed Dec. 31, 2015 (Attorney Ref. No.: 8365-87-PUS)
	38	Office Action for U.S. Patent Application No. 13/376,856, mailed Aug. 18, 2016 (Attorney Ref. No.: 8365-87-PUS)
	39	Notice of Allowance for U.S. Patent Application No. 13/376,856, mailed Sept. 27, 2016 (Attorney Ref. No.: 8365-87-PUS)

Examiner Signature		Date Considered	
-----------------------	--	--------------------	--

*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.

PATENT COOPERATION TREATY

COPY GIVEN TO IDS DEPT

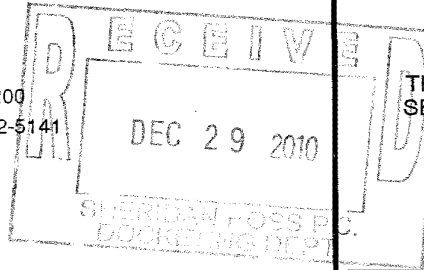
Date: 1/6/11 (CYDC)
original to JHV

PCT

From the INTERNATIONAL SEARCHING AUTHORITY

To:

Vick, Jason H.
SHERIDAN ROSS P.C.
1560 BROADWAY, SUITE 1200
DENVER, COLORADO 80202-5141
ETATS-UNIS D'AMERIQUE



NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

<p>Date of mailing (day/month/year)</p> <p style="text-align: right;">22 December 2010 (22-12-2010)</p>	
<p>Applicant's or agent's file reference</p> <p>5550-87-PCT</p>	<p>FOR FURTHER ACTION See paragraphs 1 and 4 below</p>
<p>International application No.</p> <p>PCT/US2010/046088</p>	<p>International filing date (day/month/year)</p> <p style="text-align: right;">20 August 2010 (20-08-2010)</p>
<p>Applicant</p> <p>AWARE, INC.</p>	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70

For more detailed instructions, see PCT Applicant's Guide, International Phase, paragraphs 9.004 - 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:
- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

<p>Name and mailing address of the International Searching Authority</p> <div style="text-align: center;"> </div> <p>European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016</p>	<p>Authorized officer</p> <p>PETTERSSON, Hans Tel: +49 (0)30 25901-740</p>
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 5550-87-PCT	FOR FURTHER ACTION		see Form PCT/ISA/220 as well as, where applicable, Item 5 below.
International application No. PCT/US2010/046088	International filing date (day/month/year) 20/08/2010	(Earliest) Priority Date (day/month/year) 21/08/2009	
Applicant AWARE, INC.			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☒ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. 1
☒ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/046088

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 59
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

In ☐ national application No
PCT/US2010/046088

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04L1/08
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 392 025 A2 (TOYOTA JIDOSHOKKI KK [JP]) 25 February 2004 (2004-02-25) paragraphs [0027], [0 30], [0 31], [0 51] - [0055], [0 69] - [0071]; figures 8, 11	1-58
A	WO 2007/127311 A2 (INTERDIGITAL TECH CORP [US]; ZUNIGA JUAN CARLOS [CA]; GRANDHI SUDHEER) 8 November 2007 (2007-11-08) * abstract paragraphs [0040] - [0042]; figures 3, 4 ----- -/--	1, 19, 20, 38, 56

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

16 December 2010

Date of mailing of the international search report

22/12/2010

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Masche, Christian

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/046088

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
T	<p>OKSMAN V ET AL: "G.hn: The new ITU-T home networking standard", IEEE COMMUNICATIONS MAGAZINE, IEEE SERVICE CENTER, PISCATAWAY, US, vol. 47, no. 10, 1 October 2009 (2009-10-01), pages 138-145, XP011283328, ISSN: 0163-6804, DOI: DOI:10.1109/MCOM.2009.5273821 -----</p>	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2010/046088

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 1392025	A2	25-02-2004	CN 1489347 A	14-04-2004
			JP 2004088246 A	18-03-2004
			KR 20040018119 A	02-03-2004
			TW 229991 B	21-03-2005
			US 2004179517 A1	16-09-2004
<hr/>				
WO 2007127311	A2	08-11-2007	AR 060587 A1	25-06-2008
			AU 2007243312 A1	08-11-2007
			CA 2650555 A1	08-11-2007
			CN 101433022 A	13-05-2009
			EP 2011277 A2	07-01-2009
			JP 2009534994 T	24-09-2009
			KR 20090008360 A	21-01-2009
			KR 20090018121 A	19-02-2009
			RU 2008146046 A	27-05-2010
<hr/>				

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.2

Claims Nos.: 59

Claim 59 refers to the description contrary to the requirements of Rule 6.2(a) PCT. As a consequence the subject-matter of the claim is not sufficiently clear (Article 6 PCT) for this authority to be able to perform a meaningful search for it.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2) declaration be overcome.

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2010/046088

International filing date (day/month/year)
20.08.2010

Priority date (day/month/year)
21.08.2009

International Patent Classification (IPC) or both national classification and IPC
INV. H04L1/08

Applicant
AWARE, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
Gitschiner Str. 103
D-10958 Berlin
Tel. +49 30 25901 - 0
Fax: +49 30 25901 - 840

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Masche, Christian

Telephone No. +49 30 25901-471



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2010/046088

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
 - a. (means)
 - ☐ on paper
 - ☐ in electronic form
 - b. (time)
 - ☐ in the international application as filed
 - ☐ together with the international application in electronic form
 - ☐ subsequently to this Authority for the purposes of search
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

☐ the entire international application

☒ claims Nos. 59

because:

☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search (*specify*):

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed (*specify*):

☒ no international search report has been established for the whole application or for said claims Nos. 59

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13~~ter~~.1(a) or (b).

☐ See Supplemental Box for further details

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2010/046088

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-58</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-58</u>
Industrial applicability (IA)	Yes: Claims	<u>1-58</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

1 Reference is made to the following documents:

- D1 EP 1 392 025 A2 (TOYOTA JIDOSHOKKI KK [JP]) 25 February 2004 (2004-02-25)
- D2 WO 2007/127311 A2 (INTERDIGITAL TECH CORP [US]; ZUNIGA JUAN CARLOS [CA]; GRANDHI SUDHEER) 8 November 2007 (2007-11-08)
- D3 OKSMAN V ET AL: "G.hn: The new ITU-T home networking standard", IEEE COMMUNICATIONS MAGAZINE, IEEE SERVICE CENTER, PISCATAWAY, US, vol. 47, no. 10, 1 October 2009 (2009-10-01), pages 138-145, XP011283328, ISSN: 0163-6804, DOI: DOI:10.1109/MCOM.2009.5273821

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 2 The lack of clarity mentioned below (cf. item VIII) notwithstanding, the subject-matter of claims 1 to 58 does not involve an inventive step in the sense of Article 33(3) PCT, and the criteria of Article 33(1) PCT are therefore not met.
- 2.1 The document D1 discloses (the references in brackets applying to D1):
- A communication method comprising:
- transmitting or receiving frames comprising a header symbol and 7 repetitions thereof.
- 2.2 D1 does not explicitly disclose that OFDM is used for communication. Furthermore, D1 does not disclose that the the frame is a MAP frame and that the number of header symbols is transmitted or received in an TXOP descriptor of a preceding frame. The subject-matter of present claim 1 is, therefore, new.
- 2.3 The problem solved by the new features can be regarded as to introduce a flexible redundancy scheme for header transmission.
- 2.4 The solution is regarded to be obvious. D1 is related to wireless LAN transmission (cf. [0002]) and mentions 802.11 standards ([0034], [0036]) many of which use OFDM (e.g. 802.11b/g/n) and are included in G.hn

recommendations defining TXOP descriptors and MAP frames. In D1 the number of header symbols is fixed. Rendering this number flexible necessarily leads to signalling the number of header symbols to the receiver. To include this number into a TXOP descriptor is considered to be an implementation option a skilled person would select according to the circumstances. Consequently, the subject-matter of present claim 1 does not meet the requirements of Article 33(3) PCT.

- 2.5 Similar reasoning applies to independent claims 19, 20, 38 and 56 which are related to the same subject-matter as claim 1 under different categories.
- 2.6 The additional features of dependent claims 2, 3, 18, 21, 22, 37, 39, 40 and 55 are known from D1. The additional features of dependent claims 4 to 7, 13, 14, 23 to 26, 32, 33, , 41 to 44, 50, 51, 57 and 58 are not clear enough to establish an inventive step. The additional features of dependent claims 8 to 12, 15 to 17, 27 to 30, 34 to 36, 45 to 49 and 52 to 54 are regarded as obvious design options.

Re Item VIII

Certain observations on the international application

- 3 The application does not meet the requirements of Articles 5 and 6 PCT, because the description and the claims are not clear.
- 3.1 The expressions "header OFDM symbol" or "OFDM header symbol" used in the description and throughout the claims are not clear. As generally accepted in the art an OFDM symbol is defined by the fixed number of sub-carriers available for the actual transmission channel. In the present case the relationship between OFDM, i.e. the number of sub-carriers, and the number of header bits is not clear. As a consequence the expressions "header OFDM symbol" or "OFDM header symbol" as such are unclear.
- 3.2 It is clear from the description on paragraph [0004] that the feature of header repetition is essential to the definition of the invention.

Since the independent claims do not contain this feature they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

- 3.3 Although claims 20 and 38 have been drafted as separate independent claims related to an OFDM system, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.
- 3.4 Claims 4 to 7, 23 to 26 and 41 to 45 are not clear, since, in case $D=1$, the same or the different order doesn't make sense.
- 3.5 Claims 21 to 26 are unclear when depending on claim 20, since it is not clear which of the transceivers contains their features.
- 3.6 Although claims 27 to 37 and 47 to 53 are related to an apparatus they do not contain any structural features thereof.
- 3.7 The category of claim 55 is not clear (method steps in system claim).
- 3.8 Claims 57 and 58 seem to be incomplete.

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	<p>In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/ WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT).</p> <p>If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).</p>
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

Bitte beachten Sie, dass angeführte Nichtpatentliteratur (wie z. B. wissenschaftliche oder technische Dokumente) je nach geltendem Recht dem Urheberrechtsschutz und/oder anderen Schutzarten für schriftliche Werke unterliegen könnte. Die Vervielfältigung urheberrechtlich geschützter Texte, ihre Verwendung in anderen elektronischen oder gedruckten Publikationen und ihre Weitergabe an Dritte ist ohne ausdrückliche Zustimmung des Rechtsinhabers nicht gestattet.

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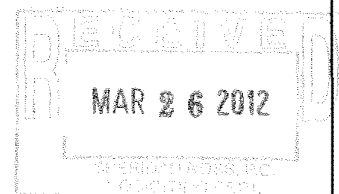
Please be aware that cited works of non-patent literature such as scientific or technical documents or the like may be subject to copyright protection and/or any other protection of written works as appropriate based on applicable laws. Copyrighted texts may not be copied or used in other electronic or printed publications or re-distributed without the express permission of the copyright holder.

From the INTERNATIONAL BUREAU

PCTNOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)

(PCT Rule 44bis.1(c))

To:

VICK, Jason, H.
Sheridan Ross P.C.
1560 Broadway
Suite 1200
Denver, CO 80202
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year) 01 March 2012 (01.03.2012)		
Applicant's or agent's file reference 5550-87-PCT		IMPORTANT NOTICE
International application No. PCT/US2010/046088	International filing date (day/month/year) 20 August 2010 (20.08.2010)	
		Priority date (day/month/year) 21 August 2009 (21.08.2009)
Applicant AWARE, INC. et al		

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Nora Lindner e-mail: pt03.pct@wipo.int
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference 5550-87-PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2010/046088	International filing date (<i>day/month/year</i>) 20 August 2010 (20.08.2010)	Priority date (<i>day/month/year</i>) 21 August 2009 (21.08.2009)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant AWARE, INC.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- | | | |
|-------------------------------------|--------------|---|
| ☒ | Box No. I | Basis of the report |
| ☐ | Box No. II | Priority |
| ☒ | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| ☐ | Box No. IV | Lack of unity of invention |
| ☒ | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| ☐ | Box No. VI | Certain documents cited |
| ☐ | Box No. VII | Certain defects in the international application |
| ☒ | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

<p style="text-align: center;">The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. +41 22 338 82 70</p>	<p>Date of issuance of this report 21 February 2012 (21.02.2012)</p> <p>Authorized officer Nora Lindner</p> <p>e-mail: pt03.pct@wipo.int</p>
--	---

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2010/046088

International filing date (day/month/year)
20.08.2010

Priority date (day/month/year)
21.08.2009

International Patent Classification (IPC) or both national classification and IPC
INV. H04L1/08

Applicant
AWARE, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
Gitschiner Str. 103
D-10958 Berlin
Tel. +49 30 25901 - 0
Fax: +49 30 25901 - 840

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Masche, Christian

Telephone No. +49 30 25901-471



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2010/046088

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
 - a. (means)
 - ☐ on paper
 - ☐ in electronic form
 - b. (time)
 - ☐ in the international application as filed
 - ☐ together with the international application in electronic form
 - ☐ subsequently to this Authority for the purposes of search
4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

- ☐ the entire international application
- ☒ claims Nos. 59

because:

- ☐ the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search (*specify*):
- ☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):
- ☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed (*specify*):
- ☒ no international search report has been established for the whole application or for said claims Nos. 59
- ☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:
 - ☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
 - ☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.
 - ☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13~~ter~~.1(a) or (b).
- ☐ See Supplemental Box for further details

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2010/046088

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-58</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-58</u>
Industrial applicability (IA)	Yes: Claims	<u>1-58</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

- 1 Reference is made to the following documents:
- D1 EP 1 392 025 A2 (TOYOTA JIDOSHOKKI KK [JP]) 25 February 2004 (2004-02-25)
- D2 WO 2007/127311 A2 (INTERDIGITAL TECH CORP [US]; ZUNIGA JUAN CARLOS [CA]; GRANDHI SUDHEER) 8 November 2007 (2007-11-08)
- D3 OKSMAN V ET AL: "G.hn: The new ITU-T home networking standard", IEEE COMMUNICATIONS MAGAZINE, IEEE SERVICE CENTER, PISCATAWAY, US, vol. 47, no. 10, 1 October 2009 (2009-10-01), pages 138-145, XP011283328, ISSN: 0163-6804, DOI: DOI:10.1109/MCOM.2009.5273821

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 2 The lack of clarity mentioned below (cf. item VIII) notwithstanding, the subject-matter of claims 1 to 58 does not involve an inventive step in the sense of Article 33(3) PCT, and the criteria of Article 33(1) PCT are therefore not met.
- 2.1 The document D1 discloses (the references in brackets applying to D1):
A communication method comprising:
transmitting or receiving frames comprising a header symbol and 7 repetitions thereof.
- 2.2 D1 does not explicitly disclose that OFDM is used for communication. Furthermore, D1 does not disclose that the the frame is a MAP frame and that the number of header symbols is transmitted or received in an TXOP descriptor of a preceding frame. The subject-matter of present claim 1 is, therefore, new.
- 2.3 The problem solved by the new features can be regarded as to introduce a flexible redundancy scheme for header transmission.
- 2.4 The solution is regarded to be obvious. D1 is related to wireless LAN transmission (cf. [0002]) and mentions 802.11 standards ([0034], [0036]) many of which use OFDM (e.g. 802.11b/g/n) and are included in G.hn

recommendations defining TXOP descriptors and MAP frames. In D1 the number of header symbols is fixed. Rendering this number flexible necessarily leads to signalling the number of header symbols to the receiver. To include this number into a TXOP descriptor is considered to be an implementation option a skilled person would select according to the circumstances. Consequently, the subject-matter of present claim 1 does not meet the requirements of Article 33(3) PCT.

- 2.5 Similar reasoning applies to independent claims 19, 20, 38 and 56 which are related to the same subject-matter as claim 1 under different categories.
- 2.6 The additional features of dependent claims 2, 3, 18, 21, 22, 37, 39, 40 and 55 are known from D1. The additional features of dependent claims 4 to 7, 13, 14, 23 to 26, 32, 33, , 41 to 44, 50, 51, 57 and 58 are not clear enough to establish an inventive step. The additional features of dependent claims 8 to 12, 15 to 17, 27 to 30, 34 to 36, 45 to 49 and 52 to 54 are regarded as obvious design options.

Re Item VIII

Certain observations on the international application

- 3 The application does not meet the requirements of Articles 5 and 6 PCT, because the description and the claims are not clear.
- 3.1 The expressions "header OFDM symbol" or "OFDM header symbol" used in the description and throughout the claims are not clear. As generally accepted in the art an OFDM symbol is defined by the fixed number of sub-carriers available for the actual transmission channel. In the present case the relationship between OFDM, i.e. the number of sub-carriers, and the number of header bits is not clear. As a consequence the expressions "header OFDM symbol" or "OFDM header symbol" as such are unclear.
- 3.2 It is clear from the description on paragraph [0004] that the feature of header repetition is essential to the definition of the invention.

Since the independent claims do not contain this feature they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

- 3.3 Although claims 20 and 38 have been drafted as separate independent claims related to an OFDM system, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought or in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.
- 3.4 Claims 4 to 7, 23 to 26 and 41 to 45 are not clear, since, in case $D=1$, the same or the different order doesn't make sense.
- 3.5 Claims 21 to 26 are unclear when depending on claim 20, since it is not clear which of the transceivers contains their features.
- 3.6 Although claims 27 to 37 and 47 to 53 are related to an apparatus they do not contain any structural features thereof.
- 3.7 The category of claim 55 is not clear (method steps in system claim).
- 3.8 Claims 57 and 58 seem to be incomplete.

Electronic Acknowledgement Receipt

EFS ID:	27499762
Application Number:	15350418
International Application Number:	
Confirmation Number:	1078
Title of Invention:	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS
First Named Inventor/Applicant Name:	Joon Bae KIM
Customer Number:	62574
Filer:	Jason Vick/Joanne Vos
Filer Authorized By:	Jason Vick
Attorney Docket Number:	8365-87-PUS-CON
Receipt Date:	14-NOV-2016
Filing Date:	
Time Stamp:	14:23:01
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		IDS_01.pdf	234892	yes	6
			7c38e948435c1db59411707796d64e6e638b04f0		

	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Transmittal Letter		1	3	
	Information Disclosure Statement (IDS) Form (SB08)		4	6	
Warnings:					
Information:					
2	Foreign Reference	EP1392025.pdf	955419	no	23
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3	Foreign Reference	WO2007127311.pdf	1010429	no	26
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Warnings:					
Information:					
4	Non Patent Literature	IEEE_Standard_802-3_Dec_2008.pdf	13139221	no	2977
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10	Non Patent Literature	Aware_Ghn_PHY_Frame_Header_Extension_Aug_2009.pdf	90598	no	7
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Information:					
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Information:					
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21	Non Patent Literature	8365-87-PCN_NOA_10-26-2015.pdf	196835	no	2
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22	Non Patent Literature	8365-87-PEP_OA_04-18-2012.pdf	102910	no	2
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Information:					
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Information:					
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Warnings:					
Information:					
25	Non Patent Literature	8365-87-PUS_OA_02-24-2015.pdf	322464	no	10
			d20f1b002ca6a1ef4c8c19154ce1df603e644701		
Warnings:					
Information:					
26	Non Patent Literature	8365-87-PUS_OA_12-31-2015.pdf	622274	no	17
			85ed9ec7499aec4b8ce7d160dfdb607cbdfa9798		
Warnings:					
Information:					
27	Non Patent Literature	8365-87-PUS_OA_08-18-2016.pdf	255296	no	8
			8067020f7bb94a6cea84c7237653e6322a0a3c06		
Warnings:					
Information:					
28	Non Patent Literature	8365-87-PUS_NOA_09-27-2016.pdf	679923	no	16
			511c733e16b8476714e4e0d18d007d3c0841ecec		
Warnings:					
Information:					
Total Files Size (in bytes):			84824084		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of:	) Group Art Unit:
Joon Bae KIM	) Confirmation No.: 1078
Serial No.: 15/350,418	) Examiner:
Filed: November 14, 2016	)
Atty File No.: 8365-87-PUS-CON	) <u>INFORMATION DISCLOSURE</u>
Entitled: "METHOD AND APPARATUS FOR	) <u>STATEMENT</u>
VARIABLE HEADER REPETITION IN A	)
WIRELESS OFDM NETWORK WITH	) Electronically Submitted
MULTIPLE OVERLAPPED FREQUENCY	)
BANDS"	)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

The references cited on attached Form PTO-1449 are being called to the attention of the Examiner.

- ☒ Copies of the cited non-patent and/or foreign references are enclosed herewith.
- ☐ Copies of the cited U.S. patents and/or patent applications are enclosed herewith.
- ☒ Copies of the cited U.S. patents/unpublished patent applications/patent application publications are not enclosed in accordance with 37 C.F.R. § 1.98(a).
- ☐ Copies of the cited references are not enclosed, in accordance with 37 C.F.R. § 1.98(d), because the references were cited by or submitted to the U.S. Patent and Trademark Office in prior application Serial No. _____ filed _____, which is relied upon for an earlier filing date under 35 U.S.C. § 120.
- ☒ To the best of applicants' belief, the pertinence of the foreign-language references are believed to be summarized in the attached English translation/abstracts and/or in the figures, although applicants do not necessarily vouch for the accuracy of the translation.
- ☒ Examiner's attention is drawn to the following related applications:
- Serial No. 13/376,856 filed Feb. 8, 2012 (Attorney Ref. No. 8365-87-PUS)
- ☐ Other: _____

Submission of the above information is not intended as an admission that any item is citable under the statutes or rules to support a rejection, that any item disclosed represents analogous art, or that those skilled in the art would refer to or recognize the pertinence of any reference without the benefit of hindsight, nor should an inference be drawn as to the pertinence of the references based on the order in which they are presented. Submission of this statement should not be taken as an indication that a search has been conducted, or that no better art exists.

It is respectfully requested that the cited information be expressly considered during the prosecution of this application and the references made of record therein.

FEES

☒	<p>37 CFR 1.97(b): No fee is believed due in connection with this submission, because the information disclosure statement submitted herewith is satisfied by one of the following conditions ("X" indicates satisfaction):</p> <p>☐ Within three months of the filing date of a national application other than a continued prosecution application under 37 CFR 1.53(d), or</p> <p>☐ Within three months of the date of entry into the national stage of an international application as set forth in 37 CFR 1.491 or</p> <p>☒ Before the mailing date of a first Office Action on the merits, or</p> <p>☐ Before the mailing of a first Office action after the filing of a request for continued examination under 37 CFR 1.114.</p> <p>Although no fee is believed due, if any fee is deemed due in connection with this submission, please charge such fee to Deposit Account 19-1970.</p>
☐	<p>37 CFR 1.97(c): The information disclosure statement transmitted herewith is being filed after all the above conditions (37 CFR 1.97(b)), but before the mailing date of one of the following conditions:</p> <p style="padding-left: 40px;">(1) a final action under 37 C.F.R. 1.113 or (2) a notice of allowance under 37 C.F.R. 1.311, or (3) an action that otherwise closes prosecution in the application.</p> <p>This Information Disclosure Statement is accompanied by:</p> <p>☐ A Certification (below) as specified by 37 C.F.R. 1.97(e). Although no fee is believed due, if any fee is deemed due in connection with this submission, please charge such fee to Deposit Account 19-1970.</p> <p style="text-align: center;">OR</p> <p>☐ Please charge Deposit Account 19-1970 in the amount of \$180.00 for the fee set forth in 37 C.F.R. 1.17(p) for submission of an information disclosure statement. Please credit any overpayment or charge any underpayment to Deposit Account 19-1970.</p>
☐	<p>37 CFR 1.97(d): This Information Disclosure Statement is being submitted after the period specified in 37 CFR 1.97(c).</p> <p>☐ This information Disclosure Statement includes a Certification (below) as specified by 37 C.F.R. 1.97(e)</p> <p style="text-align: center;">AND</p> <p>☐ Applicants hereby requests consideration of the reference(s) disclosed herein. Please charge Deposit Account 19-1970 in the amount of \$180.00 under 37 C.F.R. 1.17(p). Please credit any overpayment or charge any underpayment to Deposit Account 19-1970. Election to pay the fee should not be taken as an indication that applicant(s) cannot execute a certification.</p>

Certification (37 C.F.R. 1.97(e))

(Applicable only if checked)

☐ The undersigned certifies that:

☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement. 37 C.F.R. 1.97(e)(1).

☐ A copy of the communication from the foreign patent office is enclosed.

OR

☐ No item of information contained in this information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this Information Disclosure Statement was known to any individual designated in 37 C.F.R. 1.56(c) more than three months prior to the filing of this statement. 37 C.F.R. 1.97(e)(2).

Respectfully submitted,

SHERIDAN ROSS P.C.

Date: November 14, 2016

By: /Jason H. Vick/

Jason H. Vick
Reg. No. 45,285
1560 Broadway, Suite 1200
Denver, Colorado 80202
Telephone: 303-863-9700

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:



Practitioners associated with Customer Number:

62574

OR



Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:



The address associated with Customer Number:

62574

OR

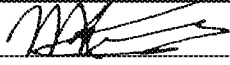
☐	Firm or Individual Name			
	Address			
	City		State	Zip
	Country			
	Telephone	Email		

Assignee Name and Address: APPLIED TRANSFORM, LLC
101 Great Road, Suite 217
Bedford, MA 01730

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be Filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	5/3/2016
Name	Marcos Tzannes	Telephone	
Title			

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Electronic Acknowledgement Receipt

EFS ID:	27499936
Application Number:	15350418
International Application Number:	
Confirmation Number:	1078
Title of Invention:	A METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS
First Named Inventor/Applicant Name:	Joon Bae KIM
Customer Number:	62574
Filer:	Jason Vick/Joanne Vos
Filer Authorized By:	Jason Vick
Attorney Docket Number:	8365-87-PUS-CON
Receipt Date:	14-NOV-2016
Filing Date:	
Time Stamp:	14:29:36
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		Statement_Under_373c_w_PO A.pdf	131831	yes	3
			3204196dd5ee016aec9a5c5bd8d7d6b075 6bffb5		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Assignee showing of ownership per 37 CFR 3.73	1	2
	Power of Attorney	3	3
Warnings:			
Information:			
Total Files Size (in bytes):		131831	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>			

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: APPLIED TRANSFORM, LLCApplication No./Patent No.: 15/350,418Filed/Issue Date: November 14, 2016Titled: METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDSAPPLIED TRANSFORM, LLC, a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Joon Bae Kim and Marcos Tzannes To: AWARE, INC.The document was recorded in the United States Patent and Trademark Office at
Reel 028591, Frame 0605, or for which a copy thereof is attached.2. From: AWARE, INC. To: APPLIED TRANSFORM, LLCThe document was recorded in the United States Patent and Trademark Office at
Reel 037491, Frame 0053, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Jason H. Vick/

Signature

Jason H. Vick

Printed or Typed Name

November 14, 2016

Date

45285

Title or Registration Number



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
15/350,418	11/14/2016	2631	3620	8365-87-PUS-CON	40	4

CONFIRMATION NO. 1078

FILING RECEIPT



0000000087370548

62574
Jason H. Vick
Sheridan Ross, PC
Suite # 1200
1560 Broadway
Denver, CO 80202

Date Mailed: 11/25/2016

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Joon Bae KIM, Lexington, MA;
Marcos C. TZANNES, Petaluma, CA;

Applicant(s)

APPLIED TRANSFORM, LLC, Bedford, MA;

Power of Attorney: The patent practitioners associated with Customer Number 62574

Domestic Priority data as claimed by applicant

This application is a CON of 13/376,856 02/08/2012
which is a 371 of PCT/US10/46088 08/20/2010
which claims benefit of 61/235,909 08/21/2009

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 11/21/2016

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/350,418**

Projected Publication Date: 03/02/2017

Non-Publication Request: No

Early Publication Request: No

Title

METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS

Preliminary Class

375

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER
Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign Assets Control, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit <http://www.SelectUSA.gov> or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 15/350,418				
APPLICATION AS FILED - PART I										
(Column 1)		(Column 2)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY				
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)			
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280			
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	600			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720			
TOTAL CLAIMS (37 CFR 1.16(j))	40 minus 20 =	* 20			OR	x 80 =	1600			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1				x 420 =	420			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00			
			TOTAL			TOTAL	3620			
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED - PART II										
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR OTHER THAN SMALL ENTITY		
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)		RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))							OR		
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.										



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/350,418	11/14/2016	Joon Bae KIM	8365-87-PUS-CON	1078
62574	7590	01/13/2017	EXAMINER	
Jason H. Vick Sheridan Ross, PC Suite # 1200 1560 Broadway Denver, CO 80202			ALI, SHAWKAT M	
			ART UNIT	PAPER NUMBER
			2633	
			NOTIFICATION DATE	DELIVERY MODE
			01/13/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jvick@sheridanross.com

Office Action Summary	Application No. 15/350,418	Applicant(s) KIM ET AL.	
	Examiner SHAWKAT M. ALI	Art Unit 2633	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/14/16.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
- 4) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 60-99 is/are pending in the application.
5a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 6) ☒ Claim(s) 60,63-70,73-88 and 90-99 is/are allowed.
- 7) ☐ Claim(s) _____ is/are rejected.
- 8) ☒ Claim(s) 61,62,71,72 and 89 is/are objected to.
- 9) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 11/14/2016 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some** c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date _____.
- 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 4) ☒ Other: EAST Search History and Bib Data Sheet.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Information Disclosure Statement (IDS)

2. The IDS submitted on 11/14/2016 has been entered and considered by the Examiner.

Claim Objections

3. Claims 61, 62, 71, 72, and 89 are objected to because:

in **claim 61** line 2 “the first, narrower frequency band” should be replaced with “the first narrower frequency band”;

in **claim 62** line 3 “the first, narrower frequency band” should be replaced with “the first narrower frequency band”;

in **claim 71** line 2 “the first, narrower frequency band” should be replaced with “the first narrower frequency band”;

in **claim 72** line 3 “the first, narrower frequency band” should be replaced with “the first narrower frequency band”; and

in **claim 89** line 3 “the first, narrower frequency band” should be replaced with “the first narrower frequency band”.

Appropriate correction is required.

Reason for Allowance

4. This instant application is a continuation of 13/376,856, which is allowed. The only difference between the instant and continuation applications is that the instant relates to modulator/transmitter whereas the continuation deals with demodulator/receiver. Therefore, same reason for allowance applies to the instant application except “demodulator/receiver” of the continuation application is replaced with “modulator/transmitter” in the instant application.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to Applicant's disclosure.

- I. Spencer (US 8,266,488 B2) discloses encoding and decoding with headers.
- II. Sharon (US 2005/0195765 A1) discloses multiband OFDM transceiver.
- III. Balakrishnan (US 2004/0228269 A1) discloses multiband OFDM communications.
- IV. Abe (US 6,580,713 B1) discloses mobile radio communication system.
- V. Bohnke (US 6,567,383 B1) discloses header structure.

6. This application is in condition for allowance except for the following formal matters:
The objections set forth above of this office Action must be overcome.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 25 USPQ 74, 453 O.G. 213, (Comm’r Pat. 1935).

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

7. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to SHAWKAT M. ALI whose telephone number is (571) 270-1639. The Examiner can normally be reached on Monday-Thursday between 9:00AM and 4:30PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's Supervisor, SAM K. AHN can be reached on (571) 272-3044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SHAWKAT M ALI/

Examiner, Art Unit 2633

Notice of References Cited	Application/Control No. 15/350,418		Applicant(s)/Patent Under Reexamination KIM ET AL.	
	Examiner SHAWKAT M. ALI		Art Unit 2633	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-8,266,488 B2	09-2012	Spencer; Paul S.	H04L1/1614	714/748
*	B	US-2005/0195765 A1	09-2005	Sharon, Eran	H04B1/7176	370/330
*	C	US-2004/0228269 A1	11-2004	Balakrishnan, Jaiganesh	H04L5/023	370/208
*	D	US-6,580,713 B1	06-2003	Abe; Masami	H04L1/18	370/394
*	E	US-6,567,383 B1	05-2003	Bohnke; Ralf	H04L5/005	370/280
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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BIB DATA SHEET

CONFIRMATION NO. 1078

SERIAL NUMBER 15/350,418	FILING or 371(c) DATE 11/14/2016 RULE	CLASS 375	GROUP ART UNIT 2633	ATTORNEY DOCKET NO. 8365-87-PUS-CON	
APPLICANTS APPLIED TRANSFORM, LLC, Bedford, MA; INVENTORS Joon Bae KIM, Lexington, MA; Marcos C. TZANNES, Petaluma, CA; ** CONTINUING DATA ***** This application is a CON of 13/376,856 02/08/2012 which is a 371 of PCT/US10/46088 08/20/2010 which claims benefit of 61/235,909 08/21/2009 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 11/21/2016					
Foreign Priority claimed ☐ Yes ☒ No 35 USC 119(a-d) conditions met ☐ Yes ☒ No Verified and Acknowledged <u>/SHAWKAT M ALI/</u> Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY MA	SHEETS DRAWINGS 8	TOTAL CLAIMS 40	INDEPENDENT CLAIMS 4
ADDRESS Jason H. Vick Sheridan Ross, PC Suite # 1200 1560 Broadway Denver, CO 80202 UNITED STATES					
TITLE METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS					
FILING FEE RECEIVED 3620	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit		

Substitute for form 1449A/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	15/350,418
				Filing Date	November 14, 2016
				First Named Inventor	Joon Bae KIM
				Art Unit	
				Examiner Name	
Sheet	1	of	3	Attorney Docket Number	8365-87-PUS-CON

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No. ¹	Document Number Number-kind Code ^{2 (if known)}	Publication Date MM-DD-YYYY	Name of Patentee of Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
/S.M.A/	1	2003/0072255	04-17-2003	Ma et al.	
/S.M.A/	2	2004/0179517	09-16-2004	Yamamoto et al.	
/S.M.A/	3	2005/0135318	06-23-2005	Walton et al.	
/S.M.A/	4	2005/0135284	06-23-2005	Nanda et al.	
/S.M.A/	5	2005/0169261	08-04-2005	Williams et al.	
/S.M.A/	6	2008/0219229	09-11-2008	Zheng	
/S.M.A/	7	2009/0086646	04-02-2009	Kuchibhotla et al.	
/S.M.A/	8	2009/0290563	11-26-2009	Gu et al.	
/S.M.A/	9	2010/0085964	04-08-2010	Weir et al.	
/S.M.A/	10	2010/0158046	06-24-2010	Pu	
/S.M.A/	11	2010/0208594	08-19-2010	Kwon et al.	
/S.M.A/	12	2010/0260137	10-14-2010	Vrzic et al.	
/S.M.A/	13	2012/0170625	07-05-2012	Kim et al.	

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No. ¹	Foreign Patent Document Country Code ³ ; Number ⁴ ; Kind Code ⁵ (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T ⁶
/S.M.A/	14	EP 1392025	02-25-2004	Kabushiki Kaisha Toyota Jidoshokki Kariya-Shi		
/S.M.A/	15	WO 2007/127311	11-08-2007	Interdigital Technology Corporation		

OTHER ART (Including Author, Title, Date, Pertinent Pages, etc.)		
Examiner Initials*	Cite No. ¹	
/S.M.A/	16	"IEEE 802.3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications" December 2008; 2977 pages

Examiner Signature	/SHAWKAT M ALI/	Date Considered	01/04/2017
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute for form 1449A/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	15/350,418
				Filing Date	November 14, 2016
				First Named Inventor	Joon Bae KIM
				Art Unit	
				Examiner Name	
Sheet	2	of	3	Attorney Docket Number	8365-87-PUS-CON

/S.M.A/	17	"IEEE 802.11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications" June 2007; 1233 pages
/S.M.A/	18	"IEEE 802.16: Air Interface for Fixed Broadband Wireless Access Systems" October 2004; 895 pages.
/S.M.A/	19	"ITU G.9960: Unified High-Speed Wire-Line Based Home Networking Transceivers - Foundation" October 2009; 112 pages
/S.M.A/	20	"ITU Standard G.997.1: Physical Layer Management for Digital Subscriber Line (DSL) Transceivers" April 2009; 128 pages
/S.M.A/	21	Aware, Inc., "G.hn: PHY-Frame Header Extension," ITU-T SG15/Q4 09CC-046, Concord, California, Aug. 2009
/S.M.A/	22	CopperGate Communications, "G.hn: Using Two Symbols for the Header of a PHY frame on Coax," ITU-T SG15/Q4 09XC-100, Xian, China, Jul. 2009.
/S.M.A/	23	Editor for G.9960, "ITU-T Recommendation G.9960: Next generation wire-line based home networking transceivers -- Foundation," ITU-T SG15/Q4, Jan. 2009.
/S.M.A/	24	Intellon, Corporation, "G.hn: Extended PHY frame header," ITU-T SG15/Q4 09XC-119, Xian, China, Jul. 2009
/S.M.A/	25	OKSMAN, et al. "G.hn: The New ITU-T Home Networking Standard" IEEE Communications Magazine, IEEE Service Center, Piscataway, US, Vol 47, No. 10, October 1, 2009, pages 138-145 XP011283328
/S.M.A/	26	International Search Report for International (PCT) Application No. PCT/US2010/046088, mailed Dec. 22, 2010 (Attorney Ref. No.: 8365-87-PCT)
/S.M.A/	27	Written Opinion for International (PCT) Application No. PCT/US2010/046088, mailed Dec. 22, 2010 (Attorney Ref. No.: 8365-87-PCT)
/S.M.A/	28	International Preliminary Report on Patentability for International (PCT) Application No. PCT/US2010/046088, mailed March 1, 2012 (Attorney Ref. No.: 8365-87-PCT)
/S.M.A/	29	Official Action (including translation) for Chinese Patent Application No. 201080037081.2, mailed December 4, 2013 (Attorney Ref. No.: 8365-87-PCN)
/S.M.A/	30	Official Action (including translation) for Chinese Patent Application No. 201080037081.2, mailed July 3, 2014 (Attorney Ref. No.: 8365-87-PCN)
/S.M.A/	31	Official Action (including translation) for Chinese Patent Application No. 201080037081.2, mailed March 23, 2015 (Attorney Ref. No.: 8365-87-PCN)
/S.M.A/	32	Notification to Grant the Patent (including translation) for Chinese Patent Application No. 201080037081.2, mailed Oct. 26, 2015 (Attorney Ref. No.: 8365-87-PCN)

Examiner Signature	/SHAWKAT M ALI/	Date Considered	01/04/2017
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.

Substitute for form 1449A/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	15/350,418
				Filing Date	November 14, 2016
				First Named Inventor	Joon Bae KIM
				Art Unit	
				Examiner Name	
Sheet	3	of	3	Attorney Docket Number	8365-87-PUS-CON

/S.M.A/	33	Communication Pursuant to Rules 161(1) and 162 EPC for European Patent Application No. 10748023.8, mailed April 18, 2012 (Attorney Ref. No.: 8365-87-PEP)
/S.M.A/	34	Office Action for European Patent Application No. 10748023.8, mailed Feb. 17, 2015 (Attorney Ref. No.: 8365-87-PEP)
/S.M.A/	35	Office Action for U.S. Patent Application No. 13/376,856, mailed June 17, 2014 (Attorney Ref. No.: 8365-87-PUS)
/S.M.A/	36	Office Action for U.S. Patent Application No. 13/376,856, mailed Feb. 24, 2015 (Attorney Ref. No.: 8365-87-PUS)
/S.M.A/	37	Office Action for U.S. Patent Application No. 13/376,856, mailed Dec. 31, 2015 (Attorney Ref. No.: 8365-87-PUS)
/S.M.A/	38	Office Action for U.S. Patent Application No. 13/376,856, mailed Aug. 18, 2016 (Attorney Ref. No.: 8365-87-PUS)
/S.M.A/	39	Notice of Allowance for U.S. Patent Application No. 13/376,856, mailed Sept. 27, 2016 (Attorney Ref. No.: 8365-87-PUS)

Examiner Signature	/SHAWKAT M ALI/	Date Considered	01/04/2017
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*EXAMINER: Initial if reference is considered, whether or not citation is in conformance and not considered. Include copy of this form with next communication to applicant.

Search Notes 	Application/Control No. 15350418	Applicant(s)/Patent Under Reexamination KIM ET AL.
	Examiner SHAWKAT M ALI	Art Unit 2633

CPC- SEARCHED		
Symbol	Date	Examiner
H04B1/38, H04B7/00, H04B7/155	1/4/2017	/SA/
H04J1/00, H04J3/00, H04J3/24, H04J11/00	1/4/2017	/SA/
H04L1/00, H04L1/08, H04L5/00, H04L12/26, H04L12/43, H04L12/56, H04L12/403, H04L27/28	1/4/2017	/SA/
H04M1/00	1/4/2017	/SA/
H04W4/00, H04W24/00, H04W52/02, H04W72/04, H04W72/12, H04W74/08	1/4/2017	/SA/

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
370	207,229,242,252,294,328,329,330,336,338,356,389,449,474	1/4/2017	/SA/
375	130,219,259,260,261,267,295,316	1/4/2017	/SA/

SEARCH NOTES		
Search Notes	Date	Examiner
Inventors, Assignee, Class/Subclass, CPC, Keywords, IEEE and Google Search	1/4/2017	/SA/

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/SHAWKAT M ALI/
Examiner Art Unit 2633

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	(13/376856).APP.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/06/06 10:59
S2	2601	((Joon) near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/06/11 09:11
S3	237	((Marcos) near2 (Tzannes)).INV.	US-PGPUB; USPAT	OR	ON	2014/06/11 09:12
S4	2832	S2 S3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:12
S5	3	S4 and "OFDM" and "TXOP" and ("MAC" "MAP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:13
S6	28058	(370/338,356,458,468).ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:51
S7	16810	(375/219,260).ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:51
S8	44525	S6 S7	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:51
S9	158	S8 and "OFDM" and "TXOP" and ("MAC" "MAP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:51
S10	80	S8 and "OFDM" and ("TXOP" same ("MAC" "MAP"))	US-PGPUB; USPAT; USOCR;	OR	ON	2014/06/11 09:52

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S11	45	S10 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:52
S13	467	beacon near2 header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/10 11:46
S14	21	"OFDM" same "TXOP" same header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/15 15:35
S15	325	"TXOP" with bit	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/15 16:59
S16	3069	"OFDM" same header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/15 16:59
S17	26	S15 and S16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/15 16:59
S18	250	((("20120275528") or ("20140233615") or ("8718118") or ("20150188742") or ("8953657") or ("9154355") or ("8537796") or ("20110080963") or ("20110110437") or ("20130336182") or ("20120189072") or ("20110216814") or ("20140119410") or ("8472537") or ("20120057483") or ("20040047296") or ("20130202017") or ("20080049601") or ("7522514") or ("7590071") or ("20090225817") or ("20140036711") or ("20130003587") or ("20090268832") or ("20110080857") or ("20100098039") or ("7916625") or ("20130094517") or ("20110211477") or ("20140334323") or ("20150003274") or ("20090296614") or ("9166860") or ("20150009855") or ("20100220725") or ("7804765") or ("20140126655") or ("20120069877") or ("20090274061") or ("8284800") or ("8755264") or ("20120236879") or ("8553579") or ("7729281") or ("7924841") or ("8842570") or ("8958350") or ("7298691") or ("20130286943"))	US-PGPUB; USPAT	OR	OFF	2015/12/16 07:21

or ("20100322295") or ("8767523") or
("20110182254") or ("8159969") or ("7577085")
or ("9148806") or ("8416677") or ("8537703") or
("20130170411") or ("9100275") or
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or ("8781016") or ("20140079145") or
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("20130107912") or ("20150055546") or
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or ("6898204") or ("20150201433") or

		("20090312073") or ("8498607") or ("20140146758") or ("20130279389") or ("20130128809") or ("20080031205") or ("20120314744") or ("20110267956") or ("7046746") or ("20110164707") or ("20110268200") or ("20090316815") or ("20060176968") or ("6882634") or ("8576931") or ("20140036775") or ("20020012337") or ("20050094569") or ("20140064262") or ("20130128808") or ("8223867") or ("20030206561") or ("20140348117") or ("20140328435") or ("7426249") or ("20080187136") or ("7433298") or ("20020057713") or ("20080170556") or ("6988236") or ("8804609") or ("20060215626") or ("8966346") or ("20100329195") or ("6950444") or ("9014205") or ("20120054584") or ("20020003792") or ("8761033") or ("20020080886") or ("20130142094") or ("8867565") or ("20070060149")).PN.				
S19	250	((("20120170625") or ("20050249266") or ("20040198265") or ("8537796") or ("7421046") or ("7580444") or ("20060140251") or ("20150327284") or ("7656850") or ("20110080963") or ("20110110437") or ("20070091785") or ("8761307") or ("8989233") or ("20140247815") or ("20150195839") or ("20140341139") or ("20130182663") or ("20140254504") or ("8681767") or ("20110176532") or ("20140286183") or ("20110013534") or ("7796716") or ("20080043888") or ("9154963") or ("8824396") or ("8498239") or ("8837440") or ("20070004465") or ("20130343267") or ("20120155408") or ("7804772") or ("20110310835") or ("20130322363") or ("7936806") or ("9166718") or ("8831121") or ("20120327875") or ("20030021237") or ("8774101") or ("20130114491") or ("20080187063") or ("20140348056") or ("20120201229") or ("9191036") or ("9130699") or ("20140019828") or ("8761229") or ("20150017989") or ("20110205999") or ("20130301549") or ("20110026642") or ("9178677") or ("8879602") or ("20060114826") or ("9118401") or ("20150094078") or ("20080130486") or ("20090310619") or ("8169994") or ("8553790") or ("8891350") or ("8102929") or ("20100272192") or ("8649443") or ("20080013640") or ("20130329661") or ("20080219235") or ("8532082") or ("20110019715") or ("8276025") or ("20100002675") or ("20120188946") or ("20130294399") or ("20100202493") or ("20140355555") or ("8848581") or ("20140016579") or ("20150036629") or ("20120087396") or ("8917697") or ("20090307541") or ("8363577") or ("8619805") or ("20120128035") or ("20100272219") or ("8050203") or ("20120163334") or ("20110274016") or ("20070091983") or ("20130195145") or ("6014545") or ("20020034267") or ("6246716") or ("20020054632") or ("7089014") or ("9066334") or ("8593979") or ("8660042") or ("20060153155") or ("8958374") or ("7983356") or ("20030027577") or ("20120287877") or ("8724742") or ("8817844") or ("20120320951") or ("20130163449") or ("20060008016") or ("8472555") or ("20150189676") or ("9078278") or ("8855073") or ("20110058626") or	US-PGPUB; USPAT	OR	OFF	2015/12/16 07:23

		("7668265") or ("20110319113") or ("20140211892") or ("7872583") or ("20110026419") or ("20130235943") or ("7460620") or ("20110110321") or ("5511090") or ("8411660") or ("20140198758") or ("20060280116") or ("9137803") or ("20120281625") or ("20150304995")).PN. or ("20120307760") or ("9112686") or ("20150289144") or ("20090004984") or ("9001935") or ("20150003379") or ("20030161411") or ("8213367") or ("20090041087") or ("8848763") or ("9088385") or ("20130315184") or ("20070263702") or ("7099413") or ("20070082633") or ("7940852") or ("20150009927") or ("8780798") or ("20020177446") or ("7706247") or ("7620112") or ("8472385") or ("7564863") or ("20130294333") or ("20070097915") or ("7483674") or ("8705655") or ("7876840") or ("7180850") or ("7280607") or ("20060029168") or ("6795485") or ("7653122") or ("20150358193") or ("7626918") or ("20130070692") or ("20110317633") or ("20140307689") or ("20090080575") or ("20140029568") or ("20140119244") or ("20090262700") or ("20150036651") or ("8284732") or ("7609712") or ("20150172949") or ("20150017923") or ("8867469") or ("20130182685") or ("20060008017") or ("20110310856") or ("20070105508") or ("6711122") or ("8660081") or ("20120269287") or ("8615046") or ("20110122846") or ("7184485") or ("9173109") or ("20140241326") or ("20060046659") or ("20070263735") or ("20110110320") or ("20150326347") or ("20110188585") or ("20070086326") or ("7853205") or ("20140126526") or ("20070081505") or ("20050237923") or ("8483086") or ("8718021") or ("9071399") or ("20070110149") or ("20070086327") or ("20050030885") or ("6477210") or ("9100152") or ("20020067755") or ("20070064587") or ("20060212773") or ("8238496") or ("8054897") or ("5278826") or ("6853675") or ("8320320") or ("20120307917") or ("20020159516") or ("8891475") or ("8547911") or ("8902869") or ("20130163530") or ("20070201350") or ("20100195614") or ("20110206147") or ("20110103338") or ("8437245") or ("8089946") or ("7039105") or ("20070121741") or ("20110051706") or ("20130016694") or ("8422465") or ("20090290552") or ("8045991") or ("7599346") or ("8693442") or ("20110211652") or ("7969311") or ("20110182332") or ("7376117") or ("20110103500") or ("8891593") or ("20130163501") or ("8089887") or ("20140269368") or ("20050190715") or ("20130028209") or ("20140119291") or ("20040081191")).PN.				
S20	6	S18 and S19	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 07:24
S21	9	S18 and "TXOP"	US-PGPUB; USPAT; USOCR;	OR	ON	2015/12/16 07:28

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S22	2	("20040179517").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/12/16 08:46
S23	2	("20070171858").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/12/16 09:53
S24	16965	((media adj access adj plan) "MAP") near3 frame	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:03
S25	7581	((transmission adj opportunity) or "TXOP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:04
S26	252	S24 and S25	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:04
S27	170	S24 and S25 and header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:04
S28	96	S24 and S25 and header and (ofdm\$1 dmt)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:05
S29	2	("20040179517").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/12/22 07:40
S31	84	((orthogonal adj frequency adj division adj multiplex\$3) or "OFDM") with ((transmission adj opportunity) or "TXOP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/26 11:24

S32	41	("20070060149" "20070177541" "20070206534" "20080075058" "20080084941" "20080192644" "20080292015" "20090196163" "20100046358" "20100067589" "20100091675" "20100118829" "20100309834" "20110002219" "20110038332" "20110096796" "20110096797" "20110128929" "20110128947" "20110310827" "20120082040" "20130286959" "7599332" "7742390" "8144647" "8149811" "8270909" "8363578" "8395997" "8472383" "8599803" "8619907" "8660497" "8670399" "8737405" "8787338" "8787385" "8811203" "8886755" "8923118" "8971350").PN. OR ("9215055").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/26 11:33
S33	16	S32 and ((transmission adj opportunity) or "TXOP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/26 11:33
S34	31	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) same ((transmission adj opportunity) or txop) same header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 11:03
S35	10	("20050226204" "20050254465" "20060018268" "20070058575" "20080036909" "20080181155" "20090040965" "7324605").PN. OR ("8817698").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 11:22
S36	73	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) same ((transmission adj opportunity) or txop) same (header packet preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 11:39
S37	42	S36 not S34	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 11:39
S38	8	S37 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 11:40
S39	19	("20030016686" "20050055406" "20050147034" "20050175014" "20060168313" "6426943" "6473425" "6606301" "6832261" "6959002" "7310337" "7457313" "7580355").PN. OR ("8139593").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 11:51
S40	64423	(370/229,294,328,329,336,338,356,449).ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:26
S41	28065	(375/219,260,267,295,316).ccls.	US-PGPUB;	OR	ON	2015/12/27

			USPAT; USOCR			12:26
S42	2815	(H04B1/38 H04B7/155).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:27
S43	1559	(H04J1/00 H04J3/00 H04J3/24 H04J11/00).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:28
S44	8852	(H04L1/00 H04L1/08 H04L5/00 H04L12/26 H04L12/43 H04L12/56 H04L12/403 H04L27/28).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:30
S45	440	(H04M1/00).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:31
S47	22074	(H04W4/00 H04W24/00 H04W52/02 H04W72/04 H04W72/12 H04W74/08).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:33
S48	117614	S40 S41 S42 S43 S44 S45 S47	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:33
S49	37065	S48 and ofdm\$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 12:33
S50	503	S49 and (((transmission adj opportunity) or txop) same (header packet preamble))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 12:34
S51	244	S49 and (((transmission adj opportunity) or txop) same (header preamble))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 12:34
S52	37	S51 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 12:35
S53	10	("20060239223" "20070232358" "20080089261" "20080130603" "6917598" "7002929" "7046649").PN. OR ("8155695").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:57
S54	761	S48 and ofdm\$1 and ((transmission adj opportunity) or txop) and header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:18
S55	186	S54 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:18

S56	149	S55 not (S34 S38 S52)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:19
S57	141	S56 and ("MAC" "MAP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:20
S58	130	S56 and ("MAC" "MAP") and frame	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:20
S59	16	("20020141375" "20040166870" "20050075104" "20070099567" "20070224936" "20080177751" "20080254810" "20090054002" "20090147867" "20090176454" "20090196173" "20090257379" "20100085903" "5237587" "5774876" "6249680").PN. OR ("8995996").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 13:58
S60	1	(13/376856).APP.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/08/07 12:51
S61	405	ofdm with packet with header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/07 15:59
S62	55	S61 and overlapp\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/07 16:00
S63	4643	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) same header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:00
S64	33411	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) same de\$1 modulat\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:02
S65	75803	frequency with overlap\$4	US-PGPUB; USPAT; USOCR;	OR	ON	2016/09/05 10:03

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S66	233	S63 and S64 and S65	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:03
S67	182	S66 and packet	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:04
S68	2	S66 and packet and (header adj bit)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:04
S69	27	("20010048694" "20050152358" "20060222005" "20080080437" "20090316637" "20100014463" "20100016023" "20100067379" "20100177755" "20100183087" "20100260114" "20110019557" "20110026623" "20110128846" "20110128900" "20110134816" "20110149822" "20110188424" "20110267959" "20110310834" "20120014335" "20140036895" "8081665" "8503367" "8509193" "8599803").PN. OR ("8982914").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/05 10:09
S70	78	S66 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 11:16
S71	7639	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) with (header pilot preamble training) with (packet frame slot)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 13:02
S72	660	(frequency with overlap\$4) and S71	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 13:03
S73	23442	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) with de\$1modulat\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 13:03
S74	230	S72 and S73	US-PGPUB;	OR	ON	2016/09/05

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			13:04
S75	130	S74 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 13:04
S76	25	("20020034213" "20030081695" "20050135308" "5732113" "6954481" "7020226").PN. OR ("7457231").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/05 13:59
S78	8	((first near2 header) same bit same (repeat\$4 or repet\$6)) and (ofdm\$ dmt) and sub\$1carrier and demodulat\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/08 13:25
S79	13	("20040066844" "20060171283" "20060215790" "20060274855" "20070195907" "20070268977" "20080279168" "5966412" "7260159" "7274653").PN. OR ("8675754").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 13:49
S80	5	((first adj3 header) same bit same (second adj3 header) same symbol) and ofdm\$1 and subcarrier and demodulat\$4	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 13:58
S81	390	(second different another other next separate 2nd) near4 (header preamble) with (packet! segment! pdu!) and (segment\$9 portions! sections!) with (channels! bands! ccs! (component near carriers!)) and @ad<="20090821"	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 14:01
S82	53	S81 and ofdm\$1	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 14:02
S83	32	("20020053058" "20030098804" "20030126551" "20040141525" "20040148546" "20040223473" "20050276266" "20060084389" "20070016838" "20070092013" "20080090583" "20080219373" "20080279322" "20100077275" "4449190" "6222889" "6829313" "6912249" "7180901" "7200799" "7213194" "7360141" "7782973" "7965710").PN. OR ("8345533").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 15:15
S84	38	header same (repeat\$4 repet\$6 duplicat\$4) same ofdm\$ same sub\$1carrier	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/09 08:15
S85	5	("20110149929" "20120243630" "20130051489" "20130064313" "20140198877").PN. OR ("8942303").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/09 08:31
S86	3238	(wid\$3 near3 band) and (narrow\$3 near3 band) and ofdm\$1	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/09 08:39
S87	54434	(second different another other next separate 2nd) near3 header	US-PGPUB; USPAT;	OR	ON	2016/09/09 08:40

			USOCR			
S88	46	S86 and S87	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/09 08:40
S89	265	("20010008837" "20010055952" "20020006799" "20020008658" "20020019214" "20020077787" "20020085503" "20020086641" "20020111772" "20020142744" "20020154614" "20020155811" "20020173272" "20020177446" "20030050012" "20030050015" "20030123420" "20030198200" "20030198304" "20030224741" "20050180528" "3812291" "4597107" "4839582" "5093927" "5142691" "5144642" "5276908" "5303262" "5355522" "5428819" "5446370" "5574979" "5608727" "5610839" "5636140" "5636903" "5655217" "5687163" "5732077" "5745777" "5752164" "5809427" "5850596" "5864541" "5889772" "5892812" "5907812" "5990833" "6031833" "6052421" "6084919" "6141565" "6167237" "6169728" "6212566" "6226680" "6229799" "6229998" "6240282" "6240372" "6256478" "6256511" "6275695" "6295461" "6307839" "6317599" "6332076" "6336780" "6349198" "6351643" "6374079" "6374082" "6385434" "6418131" "6442371" "6442507" "6466614" "6499006" "6629151" "6671495" "6711134" "6882851" "7113753").PN. OR ("7424268").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/09 10:19
S90	8	header and ofdm\$ and S89	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/09 10:20
S91	2	("8675754").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/09/10 16:37
S92	3	("20100085964").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/09/10 16:38
S93	3	("20090086646").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/09/10 16:38
S94	220338	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:43

S95	86835	(second different another other next separate 2nd multiple plural\$4) near3 header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:44
S96	2173	header with (sub\$carrier tone sub\$channel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:44
S97	8215	header with symbol	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:44
S98	138	S94 and S95 and S96 and S97	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:45
S99	67	S98 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:46
S100	89	("4281412" "4324001" "4447871" "4462108" "4516239" "4554656" "4661902" "4706246" "4774704" "5023869" "5111453" "5396519" "5465267" "5559561" "5689510" "5832233" "6009122").PN. OR ("6130894").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:31
S101	16	S97 and S100	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:31
S102	23783	(frame packet segment slot pdu) with (narrow\$3 wid\$3) with (band frequency)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:48
S103	3003	S94 and S102	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:48
S104	114	S94 and S102 and S97	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:48
S105	111	S104 not (S99 S101)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:48
S106	65	S105 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 11:48
S107	9	("20050088318" "20060009228" "20060153132" "20070291713" "20080090575" "5839071" "5875183"	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 12:13

		"6246955" "6791475").PN. OR ("8665816").URPN.				
S149	0	(15/350418).APP.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/12/28 07:38
S151	3	("20030072255").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 07:13
S152	2	("20040179517").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 07:18
S153	3	("2004/0179517").URPN.	USPAT	OR	ON	2017/01/04 07:24
S154	16	("20020071407" "20030185181" "20040179517" "20050123047" "20050147112" "20070234186" "20070297533" "20090238208" "5287463" "5802115" "6496798" "6580713" "6690719" "6925592" "7000173" "7616636").PN. OR ("8266488").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/01/04 07:31
S155	2	"20050135318"	US-PGPUB; USPAT; USOCR	OR	ON	2017/01/04 08:01
S156	2	"20050135284"	US-PGPUB; USPAT; USOCR	OR	ON	2017/01/04 08:02
S157	2	("20050169261").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:04
S158	2	("20080219229").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:04
S159	3	("20090086646").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:09
S160	2	("20090290563").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:15

S161	3	("20100085964").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:20
S162	2	("20100158046").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:22
S163	2	("20100208594").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:23
S164	2	("20100260137").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:25
S165	2	("20120170625").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:30
S166	125	((("8483040") or ("20160255179") or ("20160255178") or ("20160254935") or ("20160255177") or ("7274652") or ("20120170625") or ("8194530") or ("20160066324") or ("20070297382") or ("20120294295") or ("8537796") or ("20110164623") or ("20110080963") or ("20110110437") or ("9363121") or ("6754170") or ("20140307684") or ("8705458") or ("8780813") or ("9420490") or ("20140254349") or ("20160277170") or ("20050152473") or ("20110216814") or ("20060268671") or ("7324605") or ("8472537") or ("8625690") or ("9232505") or ("20120236971") or ("20090232084") or ("9130812") or ("20090092090") or ("20150381399") or ("20130243115") or ("20130343478") or ("9264996") or ("20140016653") or ("20140078920") or ("8717957") or ("9253291") or ("9161262") or ("8582525") or ("20160112851") or ("20100098039") or ("7756002") or ("20060211377") or ("8144572") or ("20160135086") or ("20140126450") or ("7804765") or ("20140029551") or ("20160113016") or ("20120307751") or ("8989206") or ("20040151109") or ("8885661") or ("20110194475") or ("7916625") or ("7742388") or ("8737421") or ("20130010831") or ("7965798") or ("20130028155") or ("20130034075") or ("20160029244") or ("20080212652") or ("7522514") or ("20080049601") or ("20060018249") or ("8306161") or ("9379863") or ("20130202017") or ("20140153614") or ("20090028220") or	US-PGPUB; USPAT	OR	OFF	2017/01/04 08:48

		("20040047296") or ("9226270") or ("20110080873") or ("20090268832") or ("20110255433") or ("9300510") or ("20160286011") or ("9100275") or ("20120069877") or ("20090296614") or ("20110080857") or ("20090225817") or ("20140064223") or ("20130003587") or ("20110194586") or ("20090274061") or ("20140328435") or ("8284800") or ("7590071") or ("20130170411") or ("7924841") or ("9455845") or ("9191923") or ("20100220725") or ("8780824") or ("20110044273") or ("20140036711") or ("20120263107") or ("7512185") or ("20110211477") or ("20130215993") or ("9210611") or ("8159969") or ("20130235860") or ("20150023288") or ("20120263141") or ("9049155") or ("20160249332") or ("20150009855") or ("20100214992") or ("20140334323") or ("20050195765") or ("9071990") or ("20140369263") or ("20160373945") or ("20150003274") or ("8553579") or ("20160373969") or ("20050078707")).PN.				
S167	125	((("20120275528") or ("20140233615") or ("20160020934") or ("20150188742") or ("8718118") or ("8953657") or ("20160255177") or ("9154355") or ("20160254935") or ("20160255179") or ("20160255178") or ("8537796") or ("9363121") or ("20110110437") or ("20110080963") or ("20130336182") or ("20120189072") or ("20110216814") or ("20140119410") or ("8472537") or ("20160330738") or ("20120057483") or ("20040047296") or ("20160309457") or ("20130202017") or ("20080049601") or ("7522514") or ("7590071") or ("20140036711") or ("20130003587") or ("20090268832") or ("20090225817") or ("20110080857") or ("20130094517") or ("20100098039") or ("7916625") or ("20110211477") or ("20140334323") or ("20150003274") or ("20160373945") or ("20090296614") or ("9166860") or ("20150009855") or ("20100220725") or ("20160373969") or ("7804765") or ("20090274061") or ("20140126655") or ("8284800") or ("8755264") or ("7729281") or ("20120236879") or ("20120069877") or ("8553579") or ("20160329986") or ("7924841") or ("8958350") or ("8842570") or ("7298691") or ("20130286943") or ("20100322295") or ("8767523") or ("20110182254") or ("9450794") or ("9148806") or ("7577085") or ("8159969") or ("9461857") or ("8537703") or ("8416677") or ("9100275") or ("20130170411") or ("9313739") or ("20100303096") or ("7944851") or ("9148801") or ("8165096") or ("9191469") or ("20150304217") or ("20140112225") or ("20090285164") or ("20140050133") or ("20140140358") or ("20140301208") or ("20100050054") or ("20140161126") or ("20140233551") or ("8464138") or ("20120327987") or ("20130287045") or ("9380492") or ("20140198780") or ("9351250") or ("7577122") or ("20130272309") or ("20140211678") or ("20160174102") or ("20160242115") or ("20130138982") or ("20100265999") or ("20150319272") or ("20150016426") or ("9497764") or ("20130235860") or ("7849391") or ("20160330059") or ("9049155") or	US-PGPUB; USPAT	OR	OFF	2017/01/04 08:50

		("20100061320") or ("20150016360") or ("7415661") or ("9210611") or ("20150023288") or ("7512185") or ("7062703") or ("20050195765") or ("20140369263") or ("20060193277") or ("9386585") or ("8467331") or ("20080273536") or ("20120189042") or ("20160119047") or ("8023593") or ("20090041134") or ("9071990")).PN.				
S168	47	S166 and S167	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/01/04 08:50
S169	47	header and S168	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/01/04 08:51
S170	47	S169 and ofdm\$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/01/04 08:52
S171	39	("20020085641" "20030031278" "20040141548" "20040218683" "20040228269" "20050078598" "4843352" "6108369" "7313190").PN. OR ("7512185").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/01/04 09:16

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S77	1	"Term Removed"	US-PGPUB; USPAT	OR	OFF	2016/09/08 12:07
S108	3400	((Joon) near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2016/09/11 12:37
S109	299	((Marcos) near2 (Tzannes)).INV.	US-PGPUB; USPAT	OR	ON	2016/09/11 12:37
S110	3688	S108 S109	US-PGPUB; USPAT	OR	ON	2016/09/11 12:37
S111	344	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) and S110	US-PGPUB; USPAT	OR	ON	2016/09/11 12:37
S112	99	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)).clm. and S110	US-PGPUB; USPAT	OR	ON	2016/09/11 12:38
S113	28	(header with symbol) and S112	US-PGPUB; USPAT	OR	ON	2016/09/11 12:38
S114	80	("20010009555" "20010022825" "20010046877" "20020006167" "20020013135" "20020031089" "20020046379" "20020057698" "20020060995" "20020068588" "20020076043" "20020114402" "20020126694" "20020136183" "20020159533" "20020184389" "20030012163" "20030018794" "20030040280" "20030048462" "20030053571" "20030063685" "20030087659" "20030095508"	US-PGPUB; USPAT	OR	ON	2016/09/11 12:45

		"20030099312" "20030112743" "20030112821" "20030135631" "20030142766" "20040151109" "20040215709" "20070037600" "20130003587" "20130286943" "5706428" "5797094" "5812523" "6075769" "6084917" "6108306" "6115354" "6141327" "6151508" "6181714" "6341131" "6418322" "6449246" "6535550" "6549592" "6587526" "6625764" "6671284" "6894974" "6904283" "6940831" "6987754" "6988212" "7088787" "7092436" "7106715" "7146172" "7158482" "7272117" "7274652" "7304951" "7362735" "7522514" "7590071" "7729281" "7804765" "7916625" "7924841" "7944851" "8159969" "8284800" "8416677" "8537703" "8553579" "8755264" "8842570").PN. OR ("9148806").URPN.				
S115	22	(header with symbol) and S114	US- PGPUB; USPAT	OR	ON	2016/09/11 12:46
S116	16	(header with symbol).clm. and S112	US- PGPUB; USPAT	OR	ON	2016/09/11 12:55
S117	7	(header with (sub\$carrier tone sub\$channel)).clm. and S116	US- PGPUB; USPAT	OR	ON	2016/09/11 12:56
S118	4	((frame packet segment slot pdu) with (narrow\$3 wid\$3) with (band frequency)).clm. and S112	US- PGPUB; USPAT	OR	ON	2016/09/11 12:59
S119	4	((frame packet segment slot pdu) with (narrow\$3 wid\$3) with (band frequency)).clm. and S117	US- PGPUB; USPAT	OR	ON	2016/09/11 13:00
S120	0	(repeat\$4 repet\$6 duplicat\$4 cop\$4).clm. and S119	US- PGPUB; USPAT	OR	ON	2016/09/11 13:01
S121	352	(AWARE adj INC).as.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:01
S122	70	((narrow\$3 wid\$3) with (band frequency)) and S121	US- PGPUB; USPAT	OR	ON	2016/09/11 13:02
S123	19	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)).clm. and S122	US- PGPUB; USPAT	OR	ON	2016/09/11 13:02
S124	2	(header with symbol) and S123	US- PGPUB; USPAT	OR	ON	2016/09/11 13:03
S125	12	("20030215021" "20080056390" "6115354" "20080137718" "20100208854" "20090041151" "20070218843" "20050265433" "20100158091" "20140105328" "20050243791" "8498350").PN.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:05
S126	101669	(370/207,229,242,252,294,328,329,330,336,338,356,389,449,474).ccls.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S127	33757	(375/130,219,259,260,261,267,295,316).ccls.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S128	3268	(H04B1/38 H04B7/00 H04B7/155).cpc.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S129	1685	(H04J1/00 H04J3/00 H04J3/24 H04J11/00).cpc.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S130	9724	(H04L1/00 H04L1/08 H04L5/00 H04L12/26 H04L12/43 H04L12/54 H04L12/56 H04L12/403 H04L27/28).cpc.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S131	432	(H04M1/00).cpc.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S132	24253	(H04W4/00 H04W24/00 H04W52/02 H04W72/04 H04W72/12	US-	OR	ON	2016/09/11

		H04W74/08).cpc.	PGPUB; USPAT			13:12
S133	160246	S126 S127 S128 S129 S130 S131 S132	US- PGPUB; USPAT	OR	ON	2016/09/11 13:13
S134	12830	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)).clm. and S133	US- PGPUB; USPAT	OR	ON	2016/09/11 13:13
S135	566	(header with symbol) and S134	US- PGPUB; USPAT	OR	ON	2016/09/11 13:14
S136	192	((repeat\$4 repet\$6 duplicat\$4 cop\$4) with header) and S135	US- PGPUB; USPAT	OR	ON	2016/09/11 13:14
S137	33	(header with (sub\$carrier tone sub\$channel)) and S136	US- PGPUB; USPAT	OR	ON	2016/09/11 13:15
S138	25	S137 not S113	US- PGPUB; USPAT	OR	ON	2016/09/11 13:15
S139	95	("5241545" "5420851" "5504775" "5606560" "5920547").PN. OR ("6567383").URPN.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:20
S140	3	(header with symbol) and S139	US- PGPUB; USPAT	OR	ON	2016/09/11 13:21
S141	49	("20030081538" "20040085946" "6515960" "6567383" "6643281" "6741578" "7039001").PN. OR ("7738437").URPN.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:32
S142	2	(header with symbol) and S141	US- PGPUB; USPAT	OR	ON	2016/09/11 13:33
S143	4687	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) with (frame packet segment slot pdu)).clm.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:35
S144	118	(header with symbol).clm. and S143	US- PGPUB; USPAT	OR	ON	2016/09/11 13:35
S145	17	((repeat\$4 repet\$6 duplicat\$4 cop\$4) with header) and S144 and (header with (sub\$carrier tone sub\$channel))	US- PGPUB; USPAT	OR	ON	2016/09/11 13:37
S147	0	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) with (frame packet segment slot pdu) with header with symbol with (repeat\$4 repet\$6 duplicat\$4 cop\$4) with (sub\$carrier tone sub\$channel) with (narrow\$3 wid\$3) with (band frequency)).clm.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:48
S148	0	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) same (frame packet segment slot pdu) same header same symbol same (repeat\$4 repet\$6 duplicat\$4 cop\$4) same (sub\$carrier tone sub\$channel) same (narrow\$3 wid\$3) same (band frequency))	US- PGPUB; USPAT	OR	ON	2016/09/11 13:49
S150	1	"Term Removed"	US- PGPUB; USPAT	OR	OFF	2016/12/28 08:03
S172	101840	(370/207,229,242,252,294,328,329,330,336,338,356,389,449,474).ccls.	US- PGPUB; USPAT	OR	ON	2017/01/04 09:42
S173	33773	(375/130,219,259,260,261,267,295,316).ccls.	US- PGPUB; USPAT	OR	ON	2017/01/04 09:42
S174	3421	(H04B1/38 H04B7/00 H04B7/155).cpc.	US- PGPUB; USPAT	OR	ON	2017/01/04 09:42

S175	1882	(H04J1/00 H04J3/00 H04J3/24 H04J11/00).cpc.	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S176	10158	(H04L1/00 H04L1/08 H04L5/00 H04L12/26 H04L12/43 H04L12/54 H04L12/56 H04L12/403 H04L27/28).cpc.	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S177	454	(H04M1/00).cpc.	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S178	25210	(H04W4/00 H04W24/00 H04W52/02 H04W72/04 H04W72/12 H04W74/08).cpc.	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S179	162030	S172 S173 S174 S175 S176 S177 S178	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S180	11315	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1).clm. and S179	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S181	146	(header with (sub\$carrier tone sub\$channel)) and S180	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S182	68	modulat\$4.clm. and S181	US-PGPUB; USPAT	OR	ON	2017/01/04 09:43
S183	34	S182 and @ad<="20090821"	US-PGPUB; USPAT	OR	ON	2017/01/04 09:44
S184	314	(header with (sub\$carrier tone sub\$channel)).clm.	US-PGPUB; USPAT	OR	ON	2017/01/04 10:17
S185	47	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1).clm. and S184	US-PGPUB; USPAT	OR	ON	2017/01/04 10:18
S186	24	S185 and @ad<="20090821"	US-PGPUB; USPAT	OR	ON	2017/01/04 10:18
S187	95	("5241545" "5420851" "5504775" "5606560" "5920547").PN. OR ("6567383").URPN.	US-PGPUB; USPAT	OR	ON	2017/01/04 10:25
S188	82	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1) and S187	US-PGPUB; USPAT	OR	ON	2017/01/04 10:26
S189	6	header and S188	US-PGPUB; USPAT	OR	ON	2017/01/04 10:26
S190	7	("5867478" "6473467" "6567383" "7548506" "8213292").PN. OR ("9172571").URPN.	US-PGPUB; USPAT	OR	ON	2017/01/04 10:30
S191	4	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) same (frame packet segment slot pdu) same header same modulat\$4 same (repeat\$4 repet\$6 duplicat\$4 cop\$4) same (sub\$carrier tone sub\$channel) same (narrow\$3 wid\$3)	US-PGPUB; USPAT	OR	ON	2017/01/04 10:38

<i>Index of Claims</i> 	Application/Control No. 15350418	Applicant(s)/Patent Under Reexamination KIM ET AL.
	Examiner SHAWKAT M ALI	Art Unit 2633

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	01/04/2017								
	1	-								
	2	-								
	3	-								
	4	-								
	5	-								
	6	-								
	7	-								
	8	-								
	9	-								
	10	-								
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	36	-								

<i>Index of Claims</i> 	Application/Control No. 15350418	Applicant(s)/Patent Under Reexamination KIM ET AL.
	Examiner SHAWKAT M ALI	Art Unit 2633

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant		☐ CPA		☐ T.D.		☐ R.1.47			
CLAIM		DATE							
Final	Original	01/04/2017							
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	61	O							
	62	O							
	63	=							
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	67	=							
	68	=							
	69	=							
	70	=							
	71	O							
	72	O							

<p align="center"><i>Index of Claims</i></p> 	Application/Control No. 15350418	Applicant(s)/Patent Under Reexamination KIM ET AL.
	Examiner SHAWKAT M ALI	Art Unit 2633

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
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	75	=								
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	94	=								
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	97	=								
	98	=								
	99	=								

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of: Joon Bae KIM	)	Group Art Unit: 2633
Application No.: 15/350,418	)	Examiner: ALI, SHAWKAT M
Filed: November 14, 2016	)	Confirmation No.: 1078
Atty. File No.: 8365-87-PUS-CON	)	

For: METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A
WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS

AMENDMENT AND RESPONSE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Madam:

Applicant submits this Response to address the *Ex parte Quayle Action* having a mailing date of January 13, 2017. Please credit any overpayment or charge any underpayment to Deposit Account No. 19-1970.

Please amend the above-identified patent application as follows:

Amendments to the Claims are shown in the listing of claims which begins on page 2 of this paper.

Remarks begin on page 9 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-59. (Cancelled)

60. (Previously Presented) A wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver comprising:

a modulator operable to modulate a first number of OFDM symbols to transmit a first plurality of header bits in a first packet, wherein at least one header bit of the first plurality of header bits in the first packet is repeated on a plurality of OFDM subcarriers;

a wireless OFDM communications transmitter, connected to and in communication with the modulator, operable to transmit in a first narrower frequency band, the first packet comprising the first number of OFDM symbols;

the modulator further operable to modulate a second number of OFDM symbols to transmit a second plurality of header bits in a second packet, wherein the second number of OFDM symbols is less than the first number of OFDM symbols and wherein the second plurality of header bits is different than the first plurality of header bits; and

the wireless OFDM communications transmitter further operable to transmit in a second wider frequency band, the second packet comprising the second number of OFDM symbols,

wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

61. (Currently Amended) The wireless transceiver of claim 60, wherein the at least one repeated header bit increases reliability of the first packet in the first, narrower frequency band.

62. (Currently Amended) The wireless transceiver of claim 60, wherein the at least one repeated header bit provides diversity to increase a likelihood of correctly communicating header information of the first packet in the first, narrower frequency band.

63. (Previously Presented) The wireless transceiver of claim 60, wherein the second wider frequency band is two times wider than the first narrower frequency band.

64. (Previously Presented) The wireless transceiver of claim 60, wherein the second wider frequency band is four times wider than the first narrower frequency band.

65. (Previously Presented) The wireless transceiver of claim 60, wherein the second wider frequency band is eight times wider than the first narrower frequency band.

66. (Previously Presented) The wireless transceiver of claim 60, wherein a first OFDM symbol in the first packet contains different header bits than a second OFDM symbol in the first packet.

67. (Previously Presented) The wireless transceiver of claim 60, wherein a first OFDM symbol in the first packet contains the first plurality of header bits and a second OFDM symbol in the first packet contains the first plurality of header bits.

68. (Previously Presented) The wireless transceiver of claim 60, wherein the wireless transceiver supports SmartGrid applications.

69. (Previously Presented) The wireless transceiver of claim 60, wherein the wireless transceiver supports one or more wireless standards.

70. (Previously Presented) A wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver comprising:

a modulator operable to modulate a first number of OFDM symbols to transmit a first header portion of a first packet, wherein at least one header bit of the first header portion in the first packet is repeated on a plurality of OFDM subcarriers;

a wireless OFDM communications transmitter, connected to the modulator, operable to transmit the first packet in a first narrower frequency band, wherein the first packet comprises the first header portion transmitted on the first number of OFDM symbols;

the modulator further operable to modulate a second number of OFDM symbols to transmit a second header portion of a second packet; and

the wireless OFDM communications transmit further operable to transmit the second packet in a second wider frequency band, wherein the second number of OFDM symbols is less than the first number of OFDM symbols and wherein the second header portion is different than the first header portion,

wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

71. (Currently Amended) The wireless transceiver of claim 70, wherein the at least one repeated header bit increases reliability of the first packet in the first, narrower frequency band.

72. (Currently Amended) The wireless transceiver of claim 70, wherein the at least one repeated header bit provides diversity to increase a likelihood of correctly communicating header information of the first packet in the first, narrower frequency band.

73. (Previously Presented) The wireless transceiver of claim 70, wherein the second wider frequency band is two times wider than the first narrower frequency band.

74. (Previously Presented) The wireless transceiver of claim 70, wherein the second wider frequency band is four times wider than the first narrower frequency band.

75. (Previously Presented) The wireless transceiver of claim 70, wherein the second wider frequency band is eight times wider than the first narrower frequency band.

76. (Previously Presented) The wireless transceiver of claim 70, wherein a first OFDM symbol in the first packet contains different header bits than a second OFDM symbol in the first packet.

77. (Previously Presented) The wireless transceiver of claim 70, wherein a first OFDM symbol in the first packet contains the first plurality of header bits and a second OFDM symbol in the first packet contains the first plurality of header bits.

78. (Previously Presented) The wireless transceiver of claim 70, wherein the wireless transceiver supports SmartGrid applications.

79. (Previously Presented) The wireless transceiver of claim 70, wherein the wireless transceiver supports one or more wireless standards.

80. (Previously Presented) A method of operating a wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver comprising:

modulating, by a modulator, a first number of OFDM symbols to transmit a first plurality of header bits in a first packet, wherein at least one header bit of the first plurality of header bits in the first packet is repeated on a plurality of OFDM subcarriers;

transmitting, in a first narrower frequency band, by a transmitter using wireless OFDM communications, the transmitter connected to and in communication with the modulator, the first packet comprising the first number of OFDM symbols;

modulating, by the modulator, a second number of OFDM symbols to transmit a second plurality of header bits in a second packet, wherein the second number of OFDM symbols is less than the first number of OFDM symbols and wherein the second plurality of header bits is different than the first plurality of header bits; and

transmitting, in a second band wider frequency band, by the transmitter using wireless OFDM communications, the second packet comprising the second number of OFDM symbols,

wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

81. (Previously Presented) The method of claim 80, wherein a first OFDM symbol of the first packet contains different header bits than a second OFDM symbol of the first packet.

82. (Previously Presented) The method of claim 80, wherein a first OFDM symbol of the first packet contains the first plurality of header bits and a second OFDM symbol of the first packet contains the first plurality of header bits.

83. (Previously Presented) The method of claim 80, wherein the wireless transceiver supports SmartGrid applications.

84. (Previously Presented) The method of claim 80, wherein the wireless transceiver supports one or more wireless standards.

85. (Previously Presented) The method of claim 80, wherein the second wider frequency band is two times wider than the first narrower frequency band.

86. (Previously Presented) The method of claim 80, wherein the second wider frequency band is four times wider than the first narrower frequency band.

87. (Previously Presented) The method of claim 80, wherein the second wider frequency band is eight times wider than the first narrower frequency band.

88. (Previously Presented) The method of claim 80, the at least one repeated header bit increases reliability of the first packet in the first narrower frequency band.

89. (Currently Amended) The method of claim 80, wherein the at least one repeated header bit provides diversity to increase a likelihood of correctly communicating header information of the first packet in the first narrower frequency band.

90. (Previously Presented) A method in a wireless OFDM (Orthogonal Frequency Division Multiplexing) transceiver comprising:

modulating, by a modulator, a first number of OFDM symbols to transmit a first header portion of a first packet, wherein at least one header bit of the first header portion in the first packet is repeated on a plurality of OFDM subcarriers;

transmitting, by a wireless OFDM communications transmitter, connected to the modulator, the first packet in a first narrower frequency band, wherein the first packet comprises the first header portion transmitted on the first number of OFDM symbols;

modulating, by the modulator, a second number of OFDM symbols to transmit a second header portion of a second packet; and

transmitting, by the wireless OFDM communications transmit, the second packet in a second wider frequency band, wherein the second number of OFDM symbols is less than the first number of OFDM symbols and wherein the second header portion is different than the first header portion,

wherein the first narrower and second wider frequency bands have one or more overlapping frequency regions.

91. (Previously Presented) The method of claim 90, wherein the at least one repeated header bit increases reliability of the first packet in the first narrower frequency band.

92. (Previously Presented) The method of claim 90, wherein the at least one repeated header bit provides additional diversity to increase a likelihood of correctly communicating header information of the first packet in the first narrower frequency band.

93. (Previously Presented) The method of claim 90, wherein the second wider frequency band is two times wider than the first narrower frequency band.

94. (Previously Presented) The method of claim 90, wherein the second wider frequency band is four times wider than the first narrower frequency band.

95. (Previously Presented) The method of claim 90, wherein the second wider frequency band is eight times wider than the first narrower frequency band.

96. (Previously Presented) The method of claim 90, wherein a first OFDM symbol in the first packet contains different header bits than a second OFDM symbol in the first packet.

97. (Previously Presented) The wireless method of claim 90, wherein a first OFDM symbol in the first packet contains the first plurality of header bits and a second OFDM symbol in the first packet contains the first plurality of header bits.

98. (Previously Presented) The method of claim 90, wherein the wireless transceiver supports SmartGrid applications.

99. (Previously Presented) The method of claim 90, wherein the wireless transceiver supports one or more wireless standards.

REMARKS

Applicant respectfully requests reconsideration of this application as amended.

Applicant thanks the Examiner for the indication of allowable subject matter.

By the above amendments, Applicant has addressed the claim objections identified by the Examiner in the *Ex Parte Quayle* action and amended the claims in accordance with the Examiner's recommendations.

As such, Applicant believes all objections have been resolved and that the application is in condition for allowance.

A prompt notice of allowance is respectfully solicited.

Should the Examiner believe anything further is desirable in order to place the application in even better condition for allowance, the Examiner is encouraged to contact Applicants undersigned representative at the telephone number listed below.

The Commissioner is hereby authorized to charge to deposit account number 19-1970 any fees under 37 CFR § 1.16 and 1.17 that may be required by this paper and to credit any overpayment to that Account. If any extension of time is required in connection with the filing of this paper and has not been separately requested, such extension is hereby Petitioned.

Respectfully submitted,

SHERIDAN ROSS P.C.

Date: January 17, 2017

By: /Jason H. Vick/
Jason H. Vick
Reg. No. 45,285
1560 Broadway, Suite 1200
Denver, Colorado 80202
Telephone: 303-863-9700

Electronic Acknowledgement Receipt

EFS ID:	28085426
Application Number:	15350418
International Application Number:	
Confirmation Number:	1078
Title of Invention:	METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS
First Named Inventor/Applicant Name:	Joon Bae KIM
Customer Number:	62574
Filer:	Jason Vick/Joanne Vos
Filer Authorized By:	Jason Vick
Attorney Docket Number:	8365-87-PUS-CON
Receipt Date:	17-JAN-2017
Filing Date:	14-NOV-2016
Time Stamp:	17:29:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		AMEND_01_ExParteQuayle.pdf	115566	yes	9
			0521c3126457ed4ba60e57cef237b19f6500742d		

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Response after Ex Parte Quayle Action	1	1
	Claims	2	8
	Applicant Arguments/Remarks Made in an Amendment	9	9
Warnings:			
Information:			
Total Files Size (in bytes):		115566	
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>			

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 15/350,418		Filing Date 11/14/2016		☐ To be Mailed	
ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO									
APPLICATION AS FILED – PART I									
(Column 1)			(Column 2)						
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)		FEE (\$)		
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A		N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A	N/A		N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A	N/A		N/A				
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =	*		X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =	*		X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).							
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))									
* If the difference in column 1 is less than zero, enter "0" in column 2.					TOTAL				
APPLICATION AS AMENDED – PART II									
(Column 1)			(Column 2)		(Column 3)				
AMENDMENT	01/17/2017	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 40	Minus	** 40	=	X \$ =			
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 4	=	X \$ =			
	☐ Application Size Fee (37 CFR 1.16(s))								
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE			
(Column 1)			(Column 2)		(Column 3)				
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =			
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =			
	☐ Application Size Fee (37 CFR 1.16(s))								
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE			
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>									

LIE
ELMIRA Y. HALL

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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NOTICE OF ALLOWANCE AND FEE(S) DUE

62574 7590 02/10/2017
Jason H. Vick
Sheridan Ross, PC
Suite # 1200
1560 Broadway
Denver, CO 80202

EXAMINER

ALI, SHAWKAT M

ART UNIT

PAPER NUMBER

2633

DATE MAILED: 02/10/2017

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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15/350,418

11/14/2016

Joon Bae KIM

8365-87-PUS-CON

1078

TITLE OF INVENTION: METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	05/10/2017

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

62574 7590 02/10/2017
Jason H. Vick
Sheridan Ross, PC
Suite # 1200
1560 Broadway
Denver, CO 80202

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/350,418	11/14/2016	Joon Bae KIM	8365-87-PUS-CON	1078

TITLE OF INVENTION: METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	05/10/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
ALI, SHAWKAT M	2633	375-219000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____
- (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____
- 3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/350,418	11/14/2016	Joon Bae KIM	8365-87-PUS-CON	1078

62574 7590 02/10/2017
Jason H. Vick
Sheridan Ross, PC
Suite # 1200
1560 Broadway
Denver, CO 80202

EXAMINER

ALI, SHAWKAT M

ART UNIT	PAPER NUMBER
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2633

DATE MAILED: 02/10/2017

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 15/350,418	Applicant(s) KIM ET AL.	
	Examiner SHAWKAT M. ALI	Art Unit 2633	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 01/17/2017.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 60-99 (renumbered as 1-40). As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☐ All b) ☐ Some *c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has **THREE MONTHS FROM THE "MAILING DATE"** of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. ☐ Notice of References Cited (PTO-892) | 5. ☐ Examiner's Amendment/Comment |
| 2. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 6. ☒ Examiner's Statement of Reasons for Allowance |
| 3. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. ☒ Other <u>EAST Search History</u> . |
| 4. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

/SHAWKAT M ALI/
Examiner, Art Unit 2633

DETAILED ACTION

Notice of Pre-AIA or AIA Status

1. The present application is being examined under the pre-AIA first to invent provisions.

Response to Remarks

2. With respect to the claim objections of the pervious Office Action mailed on 01/13/17 have been withdrawn due to proper amendments.

Reason for Allowance

3. Regarding claim 60, this instant application is a CON of 13/376,856 (e.g. refer to claim 19 filed on 11/07/16), which is allowed. The only difference between the instant and CONTinuation applications is that the instant relates to modulator/transmitter whereas the continuation deals with demodulator/receiver. Therefore, the same reason for allowance applies to the instant application except “demodulator/receiver” of the continuation application is replaced with “modulator/transmitter” in the instant application. Regarding claims 70, 80 and 90, these claims have substantially the same subject matter as that in claim 60. As a result, claim 70, 80 and 90 are allowed under the same rationale as claim 60.

4. Therefore, regarding claims 60-99 (renumbered as 1-40) having considered all limitations do not appear to be anticipated by, or obvious in view of, the prior art of record.

Art Unit: 2633

5. Any comments considered necessary by Applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

6. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to SHAWKAT M. ALI whose telephone number is (571) 270-1639. The Examiner can normally be reached on Monday-Thursday between 9:00AM and 4:30PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's Supervisor, SAM K. AHN can be reached on (571) 272-3044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SHAWKAT M ALI/

Examiner, Art Unit 2633

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	(13/376856).APP.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2014/06/06 10:59
S2	2601	((Joon) near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2014/06/11 09:11
S3	237	((Marcos) near2 (Tzannes)).INV.	US-PGPUB; USPAT	OR	ON	2014/06/11 09:12
S4	2832	S2 S3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:12
S5	3	S4 and "OFDM" and "TXOP" and ("MAC" "MAP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:13
S6	28058	(370/338,356,458,468).ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:51
S7	16810	(375/219,260).ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:51
S8	44525	S6 S7	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:51
S9	158	S8 and "OFDM" and "TXOP" and ("MAC" "MAP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:51
S10	80	S8 and "OFDM" and ("TXOP" same ("MAC" "MAP"))	US-PGPUB; USPAT; USOCR;	OR	ON	2014/06/11 09:52

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S11	45	S10 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2014/06/11 09:52
S13	467	beacon near2 header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/02/10 11:46
S14	21	"OFDM" same "TXOP" same header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/15 15:35
S15	325	"TXOP" with bit	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/15 16:59
S16	3069	"OFDM" same header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/15 16:59
S17	26	S15 and S16	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/15 16:59
S18	250	((("20120275528") or ("20140233615") or ("8718118") or ("20150188742") or ("8953657") or ("9154355") or ("8537796") or ("20110080963") or ("20110110437") or ("20130336182") or ("20120189072") or ("20110216814") or ("20140119410") or ("8472537") or ("20120057483") or ("20040047296") or ("20130202017") or ("20080049601") or ("7522514") or ("7590071") or ("20090225817") or ("20140036711") or ("20130003587") or ("20090268832") or ("20110080857") or ("20100098039") or ("7916625") or ("20130094517") or ("20110211477") or ("20140334323") or ("20150003274") or ("20090296614") or ("9166860") or ("20150009855") or ("20100220725") or ("7804765") or ("20140126655") or ("20120069877") or ("20090274061") or ("8284800") or ("8755264") or ("20120236879") or ("8553579") or ("7729281") or ("7924841") or ("8842570") or ("8958350") or ("7298691") or ("20130286943"))	US-PGPUB; USPAT	OR	OFF	2015/12/16 07:21

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or ("6898204") or ("20150201433") or

		("20090312073") or ("8498607") or ("20140146758") or ("20130279389") or ("20130128809") or ("20080031205") or ("20120314744") or ("20110267956") or ("7046746") or ("20110164707") or ("20110268200") or ("20090316815") or ("20060176968") or ("6882634") or ("8576931") or ("20140036775") or ("20020012337") or ("20050094569") or ("20140064262") or ("20130128808") or ("8223867") or ("20030206561") or ("20140348117") or ("20140328435") or ("7426249") or ("20080187136") or ("7433298") or ("20020057713") or ("20080170556") or ("6988236") or ("8804609") or ("20060215626") or ("8966346") or ("20100329195") or ("6950444") or ("9014205") or ("20120054584") or ("20020003792") or ("8761033") or ("20020080886") or ("20130142094") or ("8867565") or ("20070060149")).PN.				
S19	250	((("20120170625") or ("20050249266") or ("20040198265") or ("8537796") or ("7421046") or ("7580444") or ("20060140251") or ("20150327284") or ("7656850") or ("20110080963") or ("20110110437") or ("20070091785") or ("8761307") or ("8989233") or ("20140247815") or ("20150195839") or ("20140341139") or ("20130182663") or ("20140254504") or ("8681767") or ("20110176532") or ("20140286183") or ("20110013534") or ("7796716") or ("20080043888") or ("9154963") or ("8824396") or ("8498239") or ("8837440") or ("20070004465") or ("20130343267") or ("20120155408") or ("7804772") or ("20110310835") or ("20130322363") or ("7936806") or ("9166718") or ("8831121") or ("20120327875") or ("20030021237") or ("8774101") or ("20130114491") or ("20080187063") or ("20140348056") or ("20120201229") or ("9191036") or ("9130699") or ("20140019828") or ("8761229") or ("20150017989") or ("20110205999") or ("20130301549") or ("20110026642") or ("9178677") or ("8879602") or ("20060114826") or ("9118401") or ("20150094078") or ("20080130486") or ("20090310619") or ("8169994") or ("8553790") or ("8891350") or ("8102929") or ("20100272192") or ("8649443") or ("20080013640") or ("20130329661") or ("20080219235") or ("8532082") or ("20110019715") or ("8276025") or ("20100002675") or ("20120188946") or ("20130294399") or ("20100202493") or ("20140355555") or ("8848581") or ("20140016579") or ("20150036629") or ("20120087396") or ("8917697") or ("20090307541") or ("8363577") or ("8619805") or ("20120128035") or ("20100272219") or ("8050203") or ("20120163334") or ("20110274016") or ("20070091983") or ("20130195145") or ("6014545") or ("20020034267") or ("6246716") or ("20020054632") or ("7089014") or ("9066334") or ("8593979") or ("8660042") or ("20060153155") or ("8958374") or ("7983356") or ("20030027577") or ("20120287877") or ("8724742") or ("8817844") or ("20120320951") or ("20130163449") or ("20060008016") or ("8472555") or ("20150189676") or ("9078278") or ("8855073") or ("20110058626") or	US-PGPUB; USPAT	OR	OFF	2015/12/16 07:23

		("7668265") or ("20110319113") or ("20140211892") or ("7872583") or ("20110026419") or ("20130235943") or ("7460620") or ("20110110321") or ("5511090") or ("8411660") or ("20140198758") or ("20060280116") or ("9137803") or ("20120281625") or ("20150304995")).PN. or ("20120307760") or ("9112686") or ("20150289144") or ("20090004984") or ("9001935") or ("20150003379") or ("20030161411") or ("8213367") or ("20090041087") or ("8848763") or ("9088385") or ("20130315184") or ("20070263702") or ("7099413") or ("20070082633") or ("7940852") or ("20150009927") or ("8780798") or ("20020177446") or ("7706247") or ("7620112") or ("8472385") or ("7564863") or ("20130294333") or ("20070097915") or ("7483674") or ("8705655") or ("7876840") or ("7180850") or ("7280607") or ("20060029168") or ("6795485") or ("7653122") or ("20150358193") or ("7626918") or ("20130070692") or ("20110317633") or ("20140307689") or ("20090080575") or ("20140029568") or ("20140119244") or ("20090262700") or ("20150036651") or ("8284732") or ("7609712") or ("20150172949") or ("20150017923") or ("8867469") or ("20130182685") or ("20060008017") or ("20110310856") or ("20070105508") or ("6711122") or ("8660081") or ("20120269287") or ("8615046") or ("20110122846") or ("7184485") or ("9173109") or ("20140241326") or ("20060046659") or ("20070263735") or ("20110110320") or ("20150326347") or ("20110188585") or ("20070086326") or ("7853205") or ("20140126526") or ("20070081505") or ("20050237923") or ("8483086") or ("8718021") or ("9071399") or ("20070110149") or ("20070086327") or ("20050030885") or ("6477210") or ("9100152") or ("20020067755") or ("20070064587") or ("20060212773") or ("8238496") or ("8054897") or ("5278826") or ("6853675") or ("8320320") or ("20120307917") or ("20020159516") or ("8891475") or ("8547911") or ("8902869") or ("20130163530") or ("20070201350") or ("20100195614") or ("20110206147") or ("20110103338") or ("8437245") or ("8089946") or ("7039105") or ("20070121741") or ("20110051706") or ("20130016694") or ("8422465") or ("20090290552") or ("8045991") or ("7599346") or ("8693442") or ("20110211652") or ("7969311") or ("20110182332") or ("7376117") or ("20110103500") or ("8891593") or ("20130163501") or ("8089887") or ("20140269368") or ("20050190715") or ("20130028209") or ("20140119291") or ("20040081191")).PN.				
S20	6	S18 and S19	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 07:24
S21	9	S18 and "TXOP"	US-PGPUB; USPAT; USOCR;	OR	ON	2015/12/16 07:28

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S22	2	("20040179517").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/12/16 08:46
S23	2	("20070171858").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/12/16 09:53
S24	16965	((media adj access adj plan) "MAP") near3 frame	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:03
S25	7581	((transmission adj opportunity) or "TXOP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:04
S26	252	S24 and S25	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:04
S27	170	S24 and S25 and header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:04
S28	96	S24 and S25 and header and (ofdm\$1 dmt)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/16 10:05
S29	2	("20040179517").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2015/12/22 07:40
S31	84	((orthogonal adj frequency adj division adj multiplex\$3) or "OFDM") with ((transmission adj opportunity) or "TXOP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/26 11:24

S32	41	("20070060149" "20070177541" "20070206534" "20080075058" "20080084941" "20080192644" "20080292015" "20090196163" "20100046358" "20100067589" "20100091675" "20100118829" "20100309834" "20110002219" "20110038332" "20110096796" "20110096797" "20110128929" "20110128947" "20110310827" "20120082040" "20130286959" "7599332" "7742390" "8144647" "8149811" "8270909" "8363578" "8395997" "8472383" "8599803" "8619907" "8660497" "8670399" "8737405" "8787338" "8787385" "8811203" "8886755" "8923118" "8971350").PN. OR ("9215055").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/26 11:33
S33	16	S32 and ((transmission adj opportunity) or "TXOP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/26 11:33
S34	31	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) same ((transmission adj opportunity) or txop) same header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 11:03
S35	10	("20050226204" "20050254465" "20060018268" "20070058575" "20080036909" "20080181155" "20090040965" "7324605").PN. OR ("8817698").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 11:22
S36	73	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) same ((transmission adj opportunity) or txop) same (header packet preamble)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 11:39
S37	42	S36 not S34	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 11:39
S38	8	S37 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 11:40
S39	19	("20030016686" "20050055406" "20050147034" "20050175014" "20060168313" "6426943" "6473425" "6606301" "6832261" "6959002" "7310337" "7457313" "7580355").PN. OR ("8139593").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 11:51
S40	64423	(370/229,294,328,329,336,338,356,449).ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:26
S41	28065	(375/219,260,267,295,316).ccls.	US-PGPUB;	OR	ON	2015/12/27

			USPAT; USOCR			12:26
S42	2815	(H04B1/38 H04B7/155).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:27
S43	1559	(H04J1/00 H04J3/00 H04J3/24 H04J11/00).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:28
S44	8852	(H04L1/00 H04L1/08 H04L5/00 H04L12/26 H04L12/43 H04L12/56 H04L12/403 H04L27/28).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:30
S45	440	(H04M1/00).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:31
S47	22074	(H04W4/00 H04W24/00 H04W52/02 H04W72/04 H04W72/12 H04W74/08).cpc.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:33
S48	117614	S40 S41 S42 S43 S44 S45 S47	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:33
S49	37065	S48 and ofdm\$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 12:33
S50	503	S49 and (((transmission adj opportunity) or txop) same (header packet preamble))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 12:34
S51	244	S49 and (((transmission adj opportunity) or txop) same (header preamble))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 12:34
S52	37	S51 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 12:35
S53	10	("20060239223" "20070232358" "20080089261" "20080130603" "6917598" "7002929" "7046649").PN. OR ("8155695").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 12:57
S54	761	S48 and ofdm\$1 and ((transmission adj opportunity) or txop) and header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:18
S55	186	S54 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:18

S56	149	S55 not (S34 S38 S52)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:19
S57	141	S56 and ("MAC" "MAP")	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:20
S58	130	S56 and ("MAC" "MAP") and frame	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/12/27 13:20
S59	16	("20020141375" "20040166870" "20050075104" "20070099567" "20070224936" "20080177751" "20080254810" "20090054002" "20090147867" "20090176454" "20090196173" "20090257379" "20100085903" "5237587" "5774876" "6249680").PN. OR ("8995996").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/12/27 13:58
S60	1	(13/376856).APP.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/08/07 12:51
S61	405	ofdm with packet with header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/07 15:59
S62	55	S61 and overlapp\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/08/07 16:00
S63	4643	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) same header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:00
S64	33411	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) same de\$1 modulat\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:02
S65	75803	frequency with overlap\$4	US-PGPUB; USPAT; USOCR;	OR	ON	2016/09/05 10:03

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S66	233	S63 and S64 and S65	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:03
S67	182	S66 and packet	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:04
S68	2	S66 and packet and (header adj bit)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 10:04
S69	27	("20010048694" "20050152358" "20060222005" "20080080437" "20090316637" "20100014463" "20100016023" "20100067379" "20100177755" "20100183087" "20100260114" "20110019557" "20110026623" "20110128846" "20110128900" "20110134816" "20110149822" "20110188424" "20110267959" "20110310834" "20120014335" "20140036895" "8081665" "8503367" "8509193" "8599803").PN. OR ("8982914").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/05 10:09
S70	78	S66 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 11:16
S71	7639	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) with (header pilot preamble training) with (packet frame slot)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 13:02
S72	660	(frequency with overlap\$4) and S71	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 13:03
S73	23442	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 dmt (multi adj2 carrier)) with de\$1modulat\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 13:03
S74	230	S72 and S73	US-PGPUB;	OR	ON	2016/09/05

			USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB			13:04
S75	130	S74 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/05 13:04
S76	25	("20020034213" "20030081695" "20050135308" "5732113" "6954481" "7020226").PN. OR ("7457231").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/05 13:59
S78	8	((first near2 header) same bit same (repeat\$4 or repet\$6)) and (ofdm\$ dmt) and sub\$1carrier and demodulat\$4	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/08 13:25
S79	13	("20040066844" "20060171283" "20060215790" "20060274855" "20070195907" "20070268977" "20080279168" "5966412" "7260159" "7274653").PN. OR ("8675754").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 13:49
S80	5	((first adj3 header) same bit same (second adj3 header) same symbol) and ofdm\$1 and subcarrier and demodulat\$4	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 13:58
S81	390	(second different another other next separate 2nd) near4 (header preamble) with (packet! segment! pdu!) and (segment\$9 portions! sections!) with (channels! bands! ccs! (component near carriers!)) and @ad<="20090821"	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 14:01
S82	53	S81 and ofdm\$1	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 14:02
S83	32	("20020053058" "20030098804" "20030126551" "20040141525" "20040148546" "20040223473" "20050276266" "20060084389" "20070016838" "20070092013" "20080090583" "20080219373" "20080279322" "20100077275" "4449190" "6222889" "6829313" "6912249" "7180901" "7200799" "7213194" "7360141" "7782973" "7965710").PN. OR ("8345533").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/08 15:15
S84	38	header same (repeat\$4 repet\$6 duplicat\$4) same ofdm\$ same sub\$1carrier	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/09 08:15
S85	5	("20110149929" "20120243630" "20130051489" "20130064313" "20140198877").PN. OR ("8942303").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/09 08:31
S86	3238	(wid\$3 near3 band) and (narrow\$3 near3 band) and ofdm\$1	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/09 08:39
S87	54434	(second different another other next separate 2nd) near3 header	US-PGPUB; USPAT;	OR	ON	2016/09/09 08:40

			USOCR			
S88	46	S86 and S87	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/09 08:40
S89	265	("20010008837" "20010055952" "20020006799" "20020008658" "20020019214" "20020077787" "20020085503" "20020086641" "20020111772" "20020142744" "20020154614" "20020155811" "20020173272" "20020177446" "20030050012" "20030050015" "20030123420" "20030198200" "20030198304" "20030224741" "20050180528" "3812291" "4597107" "4839582" "5093927" "5142691" "5144642" "5276908" "5303262" "5355522" "5428819" "5446370" "5574979" "5608727" "5610839" "5636140" "5636903" "5655217" "5687163" "5732077" "5745777" "5752164" "5809427" "5850596" "5864541" "5889772" "5892812" "5907812" "5990833" "6031833" "6052421" "6084919" "6141565" "6167237" "6169728" "6212566" "6226680" "6229799" "6229998" "6240282" "6240372" "6256478" "6256511" "6275695" "6295461" "6307839" "6317599" "6332076" "6336780" "6349198" "6351643" "6374079" "6374082" "6385434" "6418131" "6442371" "6442507" "6466614" "6499006" "6629151" "6671495" "6711134" "6882851" "7113753").PN. OR ("7424268").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/09 10:19
S90	8	header and ofdm\$ and S89	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/09 10:20
S91	2	("8675754").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/09/10 16:37
S92	3	("20100085964").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/09/10 16:38
S93	3	("20090086646").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/09/10 16:38
S94	220338	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:43

S95	86835	(second different another other next separate 2nd multiple plural\$4) near3 header	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:44
S96	2173	header with (sub\$carrier tone sub\$channel)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:44
S97	8215	header with symbol	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:44
S98	138	S94 and S95 and S96 and S97	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:45
S99	67	S98 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 10:46
S100	89	("4281412" "4324001" "4447871" "4462108" "4516239" "4554656" "4661902" "4706246" "4774704" "5023869" "5111453" "5396519" "5465267" "5559561" "5689510" "5832233" "6009122").PN. OR ("6130894").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:31
S101	16	S97 and S100	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:31
S102	23783	(frame packet segment slot pdu) with (narrow\$3 wid\$3) with (band frequency)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:48
S103	3003	S94 and S102	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:48
S104	114	S94 and S102 and S97	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:48
S105	111	S104 not (S99 S101)	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 11:48
S106	65	S105 and @ad<="20090821"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2016/09/11 11:48
S107	9	("20050088318" "20060009228" "20060153132" "20070291713" "20080090575" "5839071" "5875183"	US-PGPUB; USPAT; USOCR	OR	ON	2016/09/11 12:13

		"6246955" "6791475").PN. OR ("8665816").URPN.				
S149	0	(15/350418).APP.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2016/12/28 07:38
S151	3	("20030072255").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 07:13
S152	2	("20040179517").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 07:18
S153	3	("2004/0179517").URPN.	USPAT	OR	ON	2017/01/04 07:24
S154	16	("20020071407" "20030185181" "20040179517" "20050123047" "20050147112" "20070234186" "20070297533" "20090238208" "5287463" "5802115" "6496798" "6580713" "6690719" "6925592" "7000173" "7616636").PN. OR ("8266488").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/01/04 07:31
S155	2	"20050135318"	US-PGPUB; USPAT; USOCR	OR	ON	2017/01/04 08:01
S156	2	"20050135284"	US-PGPUB; USPAT; USOCR	OR	ON	2017/01/04 08:02
S157	2	("20050169261").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:04
S158	2	("20080219229").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:04
S159	3	("20090086646").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:09
S160	2	("20090290563").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:15

S161	3	("20100085964").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:20
S162	2	("20100158046").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:22
S163	2	("20100208594").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:23
S164	2	("20100260137").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:25
S165	2	("20120170625").PN.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2017/01/04 08:30
S166	125	((("8483040") or ("20160255179") or ("20160255178") or ("20160254935") or ("20160255177") or ("7274652") or ("20120170625") or ("8194530") or ("20160066324") or ("20070297382") or ("20120294295") or ("8537796") or ("20110164623") or ("20110080963") or ("20110110437") or ("9363121") or ("6754170") or ("20140307684") or ("8705458") or ("8780813") or ("9420490") or ("20140254349") or ("20160277170") or ("20050152473") or ("20110216814") or ("20060268671") or ("7324605") or ("8472537") or ("8625690") or ("9232505") or ("20120236971") or ("20090232084") or ("9130812") or ("20090092090") or ("20150381399") or ("20130243115") or ("20130343478") or ("9264996") or ("20140016653") or ("20140078920") or ("8717957") or ("9253291") or ("9161262") or ("8582525") or ("20160112851") or ("20100098039") or ("7756002") or ("20060211377") or ("8144572") or ("20160135086") or ("20140126450") or ("7804765") or ("20140029551") or ("20160113016") or ("20120307751") or ("8989206") or ("20040151109") or ("8885661") or ("20110194475") or ("7916625") or ("7742388") or ("8737421") or ("20130010831") or ("7965798") or ("20130028155") or ("20130034075") or ("20160029244") or ("20080212652") or ("7522514") or ("20080049601") or ("20060018249") or ("8306161") or ("9379863") or ("20130202017") or ("20140153614") or ("20090028220") or	US-PGPUB; USPAT	OR	OFF	2017/01/04 08:48

		("20040047296") or ("9226270") or ("20110080873") or ("20090268832") or ("20110255433") or ("9300510") or ("20160286011") or ("9100275") or ("20120069877") or ("20090296614") or ("20110080857") or ("20090225817") or ("20140064223") or ("20130003587") or ("20110194586") or ("20090274061") or ("20140328435") or ("8284800") or ("7590071") or ("20130170411") or ("7924841") or ("9455845") or ("9191923") or ("20100220725") or ("8780824") or ("20110044273") or ("20140036711") or ("20120263107") or ("7512185") or ("20110211477") or ("20130215993") or ("9210611") or ("8159969") or ("20130235860") or ("20150023288") or ("20120263141") or ("9049155") or ("20160249332") or ("20150009855") or ("20100214992") or ("20140334323") or ("20050195765") or ("9071990") or ("20140369263") or ("20160373945") or ("20150003274") or ("8553579") or ("20160373969") or ("20050078707").PN.				
S167	125	((("20120275528") or ("20140233615") or ("20160020934") or ("20150188742") or ("8718118") or ("8953657") or ("20160255177") or ("9154355") or ("20160254935") or ("20160255179") or ("20160255178") or ("8537796") or ("9363121") or ("20110110437") or ("20110080963") or ("20130336182") or ("20120189072") or ("20110216814") or ("20140119410") or ("8472537") or ("20160330738") or ("20120057483") or ("20040047296") or ("20160309457") or ("20130202017") or ("20080049601") or ("7522514") or ("7590071") or ("20140036711") or ("20130003587") or ("20090268832") or ("20090225817") or ("20110080857") or ("20130094517") or ("20100098039") or ("7916625") or ("20110211477") or ("20140334323") or ("20150003274") or ("20160373945") or ("20090296614") or ("9166860") or ("20150009855") or ("20100220725") or ("20160373969") or ("7804765") or ("20090274061") or ("20140126655") or ("8284800") or ("8755264") or ("7729281") or ("20120236879") or ("20120069877") or ("8553579") or ("20160329986") or ("7924841") or ("8958350") or ("8842570") or ("7298691") or ("20130286943") or ("20100322295") or ("8767523") or ("20110182254") or ("9450794") or ("9148806") or ("7577085") or ("8159969") or ("9461857") or ("8537703") or ("8416677") or ("9100275") or ("20130170411") or ("9313739") or ("20100303096") or ("7944851") or ("9148801") or ("8165096") or ("9191469") or ("20150304217") or ("20140112225") or ("20090285164") or ("20140050133") or ("20140140358") or ("20140301208") or ("20100050054") or ("20140161126") or ("20140233551") or ("8464138") or ("20120327987") or ("20130287045") or ("9380492") or ("20140198780") or ("9351250") or ("7577122") or ("20130272309") or ("20140211678") or ("20160174102") or ("20160242115") or ("20130138982") or ("20100265999") or ("20150319272") or ("20150016426") or ("9497764") or ("20130235860") or ("7849391") or ("20160330059") or ("9049155") or	US-PGPUB; USPAT	OR	OFF	2017/01/04 08:50

		("20100061320") or ("20150016360") or ("7415661") or ("9210611") or ("20150023288") or ("7512185") or ("7062703") or ("20050195765") or ("20140369263") or ("20060193277") or ("9386585") or ("8467331") or ("20080273536") or ("20120189042") or ("20160119047") or ("8023593") or ("20090041134") or ("9071990")).PN.				
S168	47	S166 and S167	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/01/04 08:50
S169	47	header and S168	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/01/04 08:51
S170	47	S169 and ofdm\$1	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2017/01/04 08:52
S171	39	("20020085641" "20030031278" "20040141548" "20040218683" "20040228269" "20050078598" "4843352" "6108369" "7313190").PN. OR ("7512185").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2017/01/04 09:16

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S77	1	"Term Removed"	US-PGPUB; USPAT	OR	OFF	2016/09/08 12:07
S108	3400	((Joon) near2 (Kim)).INV.	US-PGPUB; USPAT	OR	ON	2016/09/11 12:37
S109	299	((Marcos) near2 (Tzannes)).INV.	US-PGPUB; USPAT	OR	ON	2016/09/11 12:37
S110	3688	S108 S109	US-PGPUB; USPAT	OR	ON	2016/09/11 12:37
S111	344	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) and S110	US-PGPUB; USPAT	OR	ON	2016/09/11 12:37
S112	99	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)).clm. and S110	US-PGPUB; USPAT	OR	ON	2016/09/11 12:38
S113	28	(header with symbol) and S112	US-PGPUB; USPAT	OR	ON	2016/09/11 12:38
S114	80	("20010009555" "20010022825" "20010046877" "20020006167" "20020013135" "20020031089" "20020046379" "20020057698" "20020060995" "20020068588" "20020076043" "20020114402" "20020126694" "20020136183" "20020159533" "20020184389" "20030012163" "20030018794" "20030040280" "20030048462" "20030053571" "20030063685" "20030087659" "20030095508"	US-PGPUB; USPAT	OR	ON	2016/09/11 12:45

		"20030099312" "20030112743" "20030112821" "20030135631" "20030142766" "20040151109" "20040215709" "20070037600" "20130003587" "20130286943" "5706428" "5797094" "5812523" "6075769" "6084917" "6108306" "6115354" "6141327" "6151508" "6181714" "6341131" "6418322" "6449246" "6535550" "6549592" "6587526" "6625764" "6671284" "6894974" "6904283" "6940831" "6987754" "6988212" "7088787" "7092436" "7106715" "7146172" "7158482" "7272117" "7274652" "7304951" "7362735" "7522514" "7590071" "7729281" "7804765" "7916625" "7924841" "7944851" "8159969" "8284800" "8416677" "8537703" "8553579" "8755264" "8842570").PN. OR ("9148806").URPN.				
S115	22	(header with symbol) and S114	US- PGPUB; USPAT	OR	ON	2016/09/11 12:46
S116	16	(header with symbol).clm. and S112	US- PGPUB; USPAT	OR	ON	2016/09/11 12:55
S117	7	(header with (sub\$carrier tone sub\$channel)).clm. and S116	US- PGPUB; USPAT	OR	ON	2016/09/11 12:56
S118	4	((frame packet segment slot pdu) with (narrow\$3 wid\$3) with (band frequency)).clm. and S112	US- PGPUB; USPAT	OR	ON	2016/09/11 12:59
S119	4	((frame packet segment slot pdu) with (narrow\$3 wid\$3) with (band frequency)).clm. and S117	US- PGPUB; USPAT	OR	ON	2016/09/11 13:00
S120	0	(repeat\$4 repet\$6 duplicat\$4 cop\$4).clm. and S119	US- PGPUB; USPAT	OR	ON	2016/09/11 13:01
S121	352	(AWARE adj INC).as.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:01
S122	70	((narrow\$3 wid\$3) with (band frequency)) and S121	US- PGPUB; USPAT	OR	ON	2016/09/11 13:02
S123	19	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)).clm. and S122	US- PGPUB; USPAT	OR	ON	2016/09/11 13:02
S124	2	(header with symbol) and S123	US- PGPUB; USPAT	OR	ON	2016/09/11 13:03
S125	12	("20030215021" "20080056390" "6115354" "20080137718" "20100208854" "20090041151" "20070218843" "20050265433" "20100158091" "20140105328" "20050243791" "8498350").PN.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:05
S126	101669	(370/207,229,242,252,294,328,329,330,336,338,356,389,449,474).ccls.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S127	33757	(375/130,219,259,260,261,267,295,316).ccls.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S128	3268	(H04B1/38 H04B7/00 H04B7/155).cpc.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S129	1685	(H04J1/00 H04J3/00 H04J3/24 H04J11/00).cpc.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S130	9724	(H04L1/00 H04L1/08 H04L5/00 H04L12/26 H04L12/43 H04L12/54 H04L12/56 H04L12/403 H04L27/28).cpc.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S131	432	(H04M1/00).cpc.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:12
S132	24253	(H04W4/00 H04W24/00 H04W52/02 H04W72/04 H04W72/12	US-	OR	ON	2016/09/11

		H04W74/08).cpc.	PGPUB; USPAT			13:12
S133	160246	S126 S127 S128 S129 S130 S131 S132	US- PGPUB; USPAT	OR	ON	2016/09/11 13:13
S134	12830	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)).clm. and S133	US- PGPUB; USPAT	OR	ON	2016/09/11 13:13
S135	566	(header with symbol) and S134	US- PGPUB; USPAT	OR	ON	2016/09/11 13:14
S136	192	((repeat\$4 repet\$6 duplicat\$4 cop\$4) with header) and S135	US- PGPUB; USPAT	OR	ON	2016/09/11 13:14
S137	33	(header with (sub\$carrier tone sub\$channel)) and S136	US- PGPUB; USPAT	OR	ON	2016/09/11 13:15
S138	25	S137 not S113	US- PGPUB; USPAT	OR	ON	2016/09/11 13:15
S139	95	("5241545" "5420851" "5504775" "5606560" "5920547").PN. OR ("6567383").URPN.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:20
S140	3	(header with symbol) and S139	US- PGPUB; USPAT	OR	ON	2016/09/11 13:21
S141	49	("20030081538" "20040085946" "6515960" "6567383" "6643281" "6741578" "7039001").PN. OR ("7738437").URPN.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:32
S142	2	(header with symbol) and S141	US- PGPUB; USPAT	OR	ON	2016/09/11 13:33
S143	4687	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) with (frame packet segment slot pdu)).clm.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:35
S144	118	(header with symbol).clm. and S143	US- PGPUB; USPAT	OR	ON	2016/09/11 13:35
S145	17	((repeat\$4 repet\$6 duplicat\$4 cop\$4) with header) and S144 and (header with (sub\$carrier tone sub\$channel))	US- PGPUB; USPAT	OR	ON	2016/09/11 13:37
S147	0	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) with (frame packet segment slot pdu) with header with symbol with (repeat\$4 repet\$6 duplicat\$4 cop\$4) with (sub\$carrier tone sub\$channel) with (narrow\$3 wid\$3) with (band frequency)).clm.	US- PGPUB; USPAT	OR	ON	2016/09/11 13:48
S148	0	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) same (frame packet segment slot pdu) same header same symbol same (repeat\$4 repet\$6 duplicat\$4 cop\$4) same (sub\$carrier tone sub\$channel) same (narrow\$3 wid\$3) same (band frequency))	US- PGPUB; USPAT	OR	ON	2016/09/11 13:49
S150	1	"Term Removed"	US- PGPUB; USPAT	OR	OFF	2016/12/28 08:03
S172	101840	(370/207,229,242,252,294,328,329,330,336,338,356,389,449,474).ccls.	US- PGPUB; USPAT	OR	ON	2017/01/04 09:42
S173	33773	(375/130,219,259,260,261,267,295,316).ccls.	US- PGPUB; USPAT	OR	ON	2017/01/04 09:42
S174	3421	(H04B1/38 H04B7/00 H04B7/155).cpc.	US- PGPUB; USPAT	OR	ON	2017/01/04 09:42

S175	1882	(H04J1/00 H04J3/00 H04J3/24 H04J11/00).cpc.	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S176	10158	(H04L1/00 H04L1/08 H04L5/00 H04L12/26 H04L12/43 H04L12/54 H04L12/56 H04L12/403 H04L27/28).cpc.	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S177	454	(H04M1/00).cpc.	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S178	25210	(H04W4/00 H04W24/00 H04W52/02 H04W72/04 H04W72/12 H04W74/08).cpc.	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S179	162030	S172 S173 S174 S175 S176 S177 S178	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S180	11315	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1).clm. and S179	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S181	146	(header with (sub\$carrier tone sub\$channel)) and S180	US-PGPUB; USPAT	OR	ON	2017/01/04 09:42
S182	68	modulat\$4.clm. and S181	US-PGPUB; USPAT	OR	ON	2017/01/04 09:43
S183	34	S182 and @ad<="20090821"	US-PGPUB; USPAT	OR	ON	2017/01/04 09:44
S184	314	(header with (sub\$carrier tone sub\$channel)).clm.	US-PGPUB; USPAT	OR	ON	2017/01/04 10:17
S185	47	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1).clm. and S184	US-PGPUB; USPAT	OR	ON	2017/01/04 10:18
S186	24	S185 and @ad<="20090821"	US-PGPUB; USPAT	OR	ON	2017/01/04 10:18
S187	95	("5241545" "5420851" "5504775" "5606560" "5920547").PN. OR ("6567383").URPN.	US-PGPUB; USPAT	OR	ON	2017/01/04 10:25
S188	82	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1) and S187	US-PGPUB; USPAT	OR	ON	2017/01/04 10:26
S189	6	header and S188	US-PGPUB; USPAT	OR	ON	2017/01/04 10:26
S190	7	("5867478" "6473467" "6567383" "7548506" "8213292").PN. OR ("9172571").URPN.	US-PGPUB; USPAT	OR	ON	2017/01/04 10:30
S191	4	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1 or (discrete adj multi adj tone) or dmt or (multi adj2 carrier)) same (frame packet segment slot pdu) same header same modulat\$4 same (repeat\$4 repet\$6 duplicat\$4 cop\$4) same (sub\$carrier tone sub\$channel) same (narrow\$3 wid\$3)	US-PGPUB; USPAT	OR	ON	2017/01/04 10:38
S193	314	(header with (sub\$carrier tone sub\$channel)).clm.	US-PGPUB; USPAT	OR	ON	2017/02/04 12:20
S194	47	((orthogonal adj frequency adj division adj multiplex\$3) or ofdm\$1).clm. and S193	US-PGPUB; USPAT	OR	ON	2017/02/04 12:21
S196	12	overlap\$5.clm. and S194	US-PGPUB; USPAT	OR	ON	2017/02/04 12:23
S197	5	(narrow\$3 wide\$3).clm. and S194	US-	OR	ON	2017/02/04

			PGPUB; USPAT			12:30
S198	1	("9363121").PN.	US- PGPUB; USPAT	OR	OFF	2017/02/04 12:33
S199	1	("8537796").PN.	US- PGPUB; USPAT	OR	OFF	2017/02/04 12:34
S201	18	S194 and modulat\$4.clm.	US- PGPUB; USPAT	OR	ON	2017/02/04 12:38
S202	11	S201 not (S196 S197)	US- PGPUB; USPAT	OR	ON	2017/02/04 12:38
S203	1	S196 and S197 and S201	US- PGPUB; USPAT	OR	ON	2017/02/04 12:43

2/ 4/ 2017 1:44:10 PM
C:\Users\sali\Documents\EAST\Workspaces\Case_227_JK_15350418.wsp

Issue Classification 	Application/Control No. 15350418	Applicant(s)/Patent Under Reexamination KIM ET AL.	
	Examiner SHAWKAT M ALI	Art Unit 2633	

CPC					
Symbol				Type	Version
H04B	1	38		F	2013-01-01
H04L	69	22		I	2013-01-01
H04L	27	2613		I	2013-01-01
H04L	27	2601		A	2013-01-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version

		Total Claims Allowed:	
		40	
(Assistant Examiner) /SHAWKAT M ALI/ Examiner Art Unit 2633	(Date) 02/06/2017	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	60	3

Issue Classification 	Application/Control No. 15350418	Applicant(s)/Patent Under Reexamination KIM ET AL.
	Examiner SHAWKAT M ALI	Art Unit 2633

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
-	1	-	17	-	33	-	49	6	65	22	81	38	97		
-	2	-	18	-	34	-	50	7	66	23	82	39	98		
-	3	-	19	-	35	-	51	8	67	24	83	40	99		
-	4	-	20	-	36	-	52	9	68	25	84				
-	5	-	21	-	37	-	53	10	69	26	85				
-	6	-	22	-	38	-	54	11	70	27	86				
-	7	-	23	-	39	-	55	12	71	28	87				
-	8	-	24	-	40	-	56	13	72	29	88				
-	9	-	25	-	41	-	57	14	73	30	89				
-	10	-	26	-	42	-	58	15	74	31	90				
-	11	-	27	-	43	-	59	16	75	32	91				
-	12	-	28	-	44	1	60	17	76	33	92				
-	13	-	29	-	45	2	61	18	77	34	93				
-	14	-	30	-	46	3	62	19	78	35	94				
-	15	-	31	-	47	4	63	20	79	36	95				
-	16	-	32	-	48	5	64	21	80	37	96				

(Assistant Examiner) _____ (Date) _____		Total Claims Allowed: 40	
/SHAWKAT M ALI/ Examiner Art Unit 2633 (Primary Examiner) _____ (Date) _____		O.G. Print Claim(s) 60	O.G. Print Figure 3

Search Notes 	Application/Control No. 15350418	Applicant(s)/Patent Under Reexamination KIM ET AL.
	Examiner SHAWKAT M ALI	Art Unit 2633

CPC- SEARCHED		
Symbol	Date	Examiner
H04B1/38, H04B7/00, H04B7/155	1/4/2017	/SA/
H04J1/00, H04J3/00, H04J3/24, H04J11/00	1/4/2017	/SA/
H04L1/00, H04L1/08, H04L5/00, H04L12/26, H04L12/43, H04L12/56, H04L12/403, H04L27/28	1/4/2017	/SA/
H04M1/00	1/4/2017	/SA/
H04W4/00, H04W24/00, H04W52/02, H04W72/04, H04W72/12, H04W74/08	1/4/2017	/SA/

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
370	207,229,242,252,294,328,329,330,336,338,356,389,449,474	1/4/2017	/SA/
375	130,219,259,260,261,267,295,316	1/4/2017	/SA/

SEARCH NOTES		
Search Notes	Date	Examiner
Inventors, Assignee, Class/Subclass, CPC, Keywords, IEEE and Google Search	1/4/2017	/SA/

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	EAST Interference Search	2/4/2017	/SA/

/SHAWKAT M ALI/
Examiner Art Unit 2633

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

62574 7590 02/10/2017
Jason H. Vick
Sheridan Ross, PC
Suite # 1200
1560 Broadway
Denver, CO 80202

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/350,418	11/14/2016	Joon Bae KIM	8365-87-PUS-CON	1078

TITLE OF INVENTION: METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	05/10/2017

EXAMINER	ART UNIT	CLASS-SUBCLASS
ALI, SHAWKAT M	2633	375-219000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
- (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Jason H. Vick

2 Sheridan Ross, PC

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

APPLIED TRANSFORM, LLC ,

BEDFORD, MA

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 19-1970 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /Jason H. Vick/

Date February 17, 2017

Typed or printed name Jason H. Vick

Registration No. 45,285

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of: Joon Bae KIM	)	Group Art Unit: 2633
Application No.: 15/350,418	)	Examiner: ALI, SHAWKAT M
Filed: November 14, 2016	)	Confirmation No.: 1078
Atty. File No.: 8365-87-PUS-CON	)	

For: METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A
WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313

Madam:

Applicant submits this Comments on Statement of Reasons for Allowance to address further the Notice of Allowability ("Notice") having a mailing date of February 10, 2017.

In the Notice, the Examiner's stated reasons for allowance were that:

Regarding claim 60, this instant application is a CON of 13/376,856 (e.g. refer to claim 19 filed on 11/07/16), which is allowed. The only difference between the instant and Continuation applications is that the instant relates to modulator/transmitter whereas the continuation deals with demodulator/receiver. Therefore, the same reason for allowance applies to the instant application except "demodulator/receiver" of the continuation application is replaced with "modulator/transmitter" in the instant application. Regarding claims 70, 80 and 90, these claims have substantially the same subject matter as that in claim 60. As a result, claim 70, 80 and 90 are allowed under the same rationale as claim 60.

Therefore, regarding claims 60-99 (renumbered as 1-40) having considered all limitations do not appear to be anticipated by, or obvious in view of, the prior art of record

While the stated Reasons for Allowance may be a stated reason for allowing some independent claims, Applicant submits that some independent claims have a different reason for allowance and that some independent claims have other reasons for allowance.

Specifically, the prior art fails to teach the specific combination of features as recited in the independent claims 60, 70, 80, and 90.

Although the Applicant believes that no fees are due for filing this Comments on Statement of Reasons for Allowance, please charge any fees deemed necessary to Deposit Account No. 19-1970.

Respectfully submitted,

SHERIDAN ROSS P.C.

Date: February 17, 2017

By: /Jason H. Vick/
Jason H. Vick,
Reg. No. 45,285
1560 Broadway, Suite 1200
Denver, Colorado 80202
Telephone: 303-863-9700

REMARKS

By this amendment, the Related Application Data has been updated. No new matter is believed to be introduced by this amendment.

The Commissioner is hereby authorized to charge to deposit account number 19-1970 any fees under 37 CFR § 1.16 and 1.17 that may be required by this paper and to credit any overpayment to that Account. If any extension of time is required in connection with the filing of this paper and has not been separately requested, such extension is hereby petitioned.

Respectfully submitted,

SHERIDAN ROSS P.C.

Date: February 17, 2017

By: /Jason H. Vick/
Jason H. Vick
Reg. No. 45,285
1560 Broadway, Suite 1200
Denver, Colorado 80202
Telephone: 303-863-9700

AMENDMENTS TO THE SPECIFICATION

Please amend the first paragraph of the application beneath the heading “RELATED APPLICATION DATA”:

[0001] This application is a continuation of U.S. Patent Application No. 13/376,856, filed February 8, 2012, now U.S. Patent No. 9,584,262, which is a national stage application under 35 U.S.C. 371 of PCT Application No. PCT/US2010/046088, having an international filing date of August 20, 2010, which designated the United States, which PCT application claims the benefit of and priority under 35 U.S.C. §119(e) to U.S. Patent Application No. 61/235,909, filed August 21, 2009, entitled “Header Repetition Scheme in Packet-Based OFDM Systems,” each of which are incorporated herein by reference in their entirety.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re the Application of: Joon Bae KIM	)	Group Art Unit: 2633
Application No.: 15/350,418	)	Examiner: ALI, SHAWKAT M
Filed: November 14, 2016	)	Confirmation No.: 1078
Atty. File No.: 8365-87-PUS-CON	)	

For: METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A
WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS

AMENDMENT AFTER ALLOWANCE UNDER
37 C.F.R. 1.312

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Madam:

Applicants submit this Amendment After Allowance pursuant to 37 C.F.R. 1.312 in response to the Notice of Allowance having a mailing date of February 10, 2017. While Applicants believe that no fees are due with the filing of this response, the undersigned hereby authorizes the charge of any fees deemed necessary to Deposit Account No. 19-1970.

An amendment may be entered after the mailing of a Notice of Allowance but prior to payment of the issue fee upon recommendation of the primary Examiner. Therefore, it is respectfully requested that the above-referenced application be amended as follows:

Amendments to the Specification begin on page 2 of this paper.

Remarks begin on page 3 of this paper.

Electronic Patent Application Fee Transmittal				
Application Number:		15350418		
Filing Date:		14-Nov-2016		
Title of Invention:		METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS		
First Named Inventor/Applicant Name:		Joon Bae KIM		
Filer:		Jason Vick/Joanne Vos		
Attorney Docket Number:		8365-87-PUS-CON		
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				960

Electronic Acknowledgement Receipt

EFS ID:	28391228
Application Number:	15350418
International Application Number:	
Confirmation Number:	1078
Title of Invention:	METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS
First Named Inventor/Applicant Name:	Joon Bae KIM
Customer Number:	62574
Filer:	Jason Vick/Joanne Vos
Filer Authorized By:	Jason Vick
Attorney Docket Number:	8365-87-PUS-CON
Receipt Date:	17-FEB-2017
Filing Date:	14-NOV-2016
Time Stamp:	13:48:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$960
RAM confirmation Number	022117INTEFSW00000027191970
Deposit Account	191970
Authorized User	Joanne Vos

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)
37 CFR 1.20 (Post Issuance fees)
37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	ISSUE_FEE_PAYMENT.pdf	197584	no	1
			e77c79dfb7e8f8936ae04b2cfb922fd3c8d2deb1		
Warnings:					
Information:					
2	Post Allowance Communication - Incoming	Comments_on_Reason_for_Allowance.pdf	73426	no	2
			7fa3a6451890346b50d22e96e3b5888d6ac36db4		
Warnings:					
Information:					
3		AMEND_312.pdf	87262	yes	3
			8201703a46cedbf9696a0bc51ea12213f5d77875		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Applicant Arguments/Remarks Made in an Amendment		3	3	
	Specification		2	2	
	Amendment after Notice of Allowance (Rule 312)		1	1	
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30798	no	2
			c9836980ff44c9699124131854b55b5c20cf916		
Warnings:					
Information:					
Total Files Size (in bytes):			389070		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/350,418	11/14/2016	Joon Bae KIM	8365-87-PUS-CON

CONFIRMATION NO. 1078

PUBLICATION NOTICE



OC000000089604125

62574
Jason H. Vick
Sheridan Ross, PC
Suite # 1200
1560 Broadway
Denver, CO 80202

Title:METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS

Publication No.US-2017-0063415-A1

Publication Date:03/02/2017

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/350,418	11/14/2016	Joon Bae KIM	8365-87-PUS-CON	1078
62574	7590	03/03/2017	EXAMINER	
Jason H. Vick Sheridan Ross, PC Suite # 1200 1560 Broadway Denver, CO 80202			ALI, SHAWKAT M	
			ART UNIT	PAPER NUMBER
			2633	
			NOTIFICATION DATE	DELIVERY MODE
			03/03/2017	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jvick@sheridanross.com

Response to Rule 312 Communication	Application No. 15/350,418	Applicant(s) KIM ET AL.
	Examiner SHAWKAT M. ALI	Art Unit 2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☒ The amendment filed on 17 February 2017 under 37 CFR 1.312 has been considered, and has been:

a) ☒ entered.

b) ☐ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.

Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

	/SHAWKAT M ALI/ Primary Examiner, Art Unit 2633
--	--



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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/350,418	04/04/2017	9614566	8365-87-PUS-CON	1078

62574 7590 03/15/2017

Jason H. Vick
Sheridan Ross, PC
Suite # 1200
1560 Broadway
Denver, CO 80202

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Joon Bae KIM, Lexington, MA;
APPLIED TRANSFORM, LLC, Bedford, MA;
Marcos C. TZANNES, Petaluma, CA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT6890261

SUBMISSION TYPE:	NEW ASSIGNMENT	
NATURE OF CONVEYANCE:	ASSIGNMENT	
CONVEYING PARTY DATA		
	Name	Execution Date
	APPLIED TRANSFORM, LLC	08/26/2021
RECEIVING PARTY DATA		
Name:	AX WIRELESS LLC	
Street Address:	3000 POLAR LANE	
City:	CEDAR PARK	
State/Country:	TEXAS	
Postal Code:	78613	
PROPERTY NUMBERS Total: 9		
Property Type	Number	
Application Number:	61235909	
Patent Number:	9584262	
Patent Number:	9614566	
Patent Number:	9973361	
Patent Number:	10079707	
Patent Number:	10291449	
Patent Number:	10554459	
Patent Number:	10917272	
Application Number:	17136801	
CORRESPONDENCE DATA		
Fax Number:		
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>		
Email:	keith@axwireless.net	
Correspondent Name:	AX WIRELESS LLC	
Address Line 1:	3000 POLAR LANE	
Address Line 4:	CEDAR PARK, TEXAS 78613	
NAME OF SUBMITTER:	KEITH IM	
SIGNATURE:	/keith k. Im/	
DATE SIGNED:	08/30/2021	

Total Attachments: 5

source=Patent Assignment for AX Wireless (8-26-2021)#page1.tif

source=Patent Assignment for AX Wireless (8-26-2021)#page2.tif

source=Patent Assignment for AX Wireless (8-26-2021)#page3.tif

source=Patent Assignment for AX Wireless (8-26-2021)#page4.tif

source=Patent Assignment for AX Wireless (8-26-2021)#page5.tif

EXHIBIT B

PATENT ASSIGNMENT

This Patent Assignment (this "*Assignment*"), is made and entered into as of August 26, 2021 (the "*Effective Date*"), by Applied Transform, LLC, a Delaware Limited Liability Company ("*Assignor*"), with respect to the assignment of certain patent assets to AX Wireless, LLC, a Texas Limited Liability Company ("*Assignee*").

WHEREAS, Assignee and Assignor have entered into that certain Patent Transfer Agreement, dated August 2021 (the "*Patent Transfer Agreement*"), pursuant to which Assignor has agreed to assign and transfer to Assignee, and Assignee has agreed to receive all of Assignor's right, title and interest in and to (a) those patents and patent applications listed on Appendix I attached hereto (collectively, the "*Listed Patents*"), including any reissues, reexaminations, continuations, continuations-in-part, divisionals and foreign counter-parts thereof, but in each case only to the extent first filed on or after the Effective Date, where "*Priority*" means a formal claim of priority to the filing date of an earlier patent or patent application that is expressly made (i) in a U.S. patent under 35 U.S.C. § 119, 35 U.S.C. § 120, 35 U.S.C. § 121, or 35 U.S.C. § 365; or (ii) in a foreign patent under the corresponding legal requirements for claiming priority in the foreign country, including under the Paris Convention or PCT (collectively the "*Assigned Patents*");

NOW, THEREFORE, in consideration of entering into the Patent Transfer Agreement and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Assignor agrees as follows:

Assignor does hereby assign and transfer and convey unto Assignee its entire right, title and interest in and to the Assigned Patents listed in Appendix I hereto, including Assignor's rights under the Assigned Patents to sue for injunctive relief and damages for past, present and future infringement of the Assigned Patents.

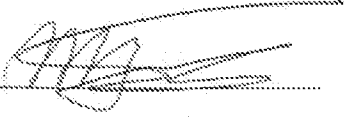
Assignor hereby authorizes the respective patent office or governmental agency to record the Assigned Patents and any reissues or reexaminations thereof in the name of Assignee, as the assignee of the entire interest therein.

This Assignment shall be construed and interpreted in accordance with the Patent Transfer Agreement. Nothing in this Assignment shall, or shall be deemed to, modify or otherwise affect any provisions of the Patent Transfer Agreement or affect or modify or expand any of the rights or obligations of the parties under the Patent Transfer Agreement. In the event of any conflict between the provisions hereof and the provisions of the Patent Transfer Agreement, the provisions of the Patent Transfer Agreement shall govern and control. Neither Assignor nor Assignee makes any representations or warranties of any kind, whether express, implied, or otherwise, under this Assignment, all of which are governed solely by the Patent Transfer Agreement.

Confidential
Patent Transfer Agreement

IN WITNESS WHEREOF, Assignor has caused this Assignment to be executed by its respective duly authorized representative as of the Effective Date.

Applied Transform, LLC

By: 

Name:

Title:

ACKNOWLEDGMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California SONOMA
County of SONOMA

On 8/26/2021 before me, URIEL RENE MEDINA DEL TORO, Notary Public
(insert name and title of the officer)

personally appeared MARCOS C. TRANNES
who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature [Signature] (Seal)

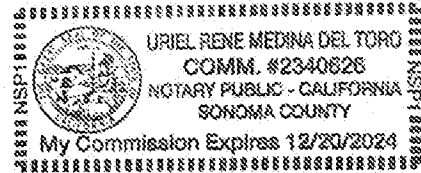


EXHIBIT A LISTED PATENTS

Applied Transforms, LLC - 8365-87 Family

Reference #	Title	Country ID	Status	Serial #	Filed Date	Publication #	Patent #	Issue Date
8365-87-PCN	Header Repetition Scheme in Packet-Based OFDM Systems	CN	ISSUED	20108003708 1.2	8/20/2010	CN102484567	ZL201080037081.2	2/10/2016
8365-87-PCN-DIV	OFDM Communication Method and OFDM Communication Transmitter	CN	ABANDONED	20161001574 7.3	8/20/2010	CN 105681000 A		
8365-87-PCT	Header Repetition Scheme in Packet-Based OFDM Systems	WO	NAT PHASE	PCT/US2010/ 046088	8/20/2010	WO 2011/022593		
8365-87-PEP	Header Repetition Scheme in Packet-Based OFDM Systems	EP	ABANDONED	10748023.8	8/20/2010	2467962		
8365-87-PROV	Header Repetition Scheme in Packet-Based OFDM Systems	US	EXPIRED	61/235,909	8/21/2009	N/A		
8365-87-PUS	METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS	US	ISSUED	13/376,856	2/8/2012	US 2012-0170625 A1	9,584,262	2/28/2017
8365-87-PUS-CON	METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH MULTIPLE OVERLAPPED FREQUENCY BANDS	US	ISSUED	15/350,418	11/14/2016	US 2017-0063415 A1	9,614,566	4/4/2017
8365-87-PUS-CON-2	TRANSMITTER METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK	US	ISSUED	15/476,284	3/31/2017	US 2017-0207840 A1	9,973,361	5/15/2018
8365-87-PUS-CON-3	RECEIVER METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK	US	ISSUED	15/956,519	4/20/2018	US 2018-0248725 A1	10,079,707	9/18/2018
8365-87-PUS-CON-4	TRANSMITTER METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH DIFFERENT CHANNEL BANDWIDTHS	US	ISSUED	16/125,206	9/7/2018	US 2019-0007247 A1	10,291,449	5/14/2019

8365-87-PUS- CON-5	RECEIVER METHOD AND APPARATUS FOR VARIABLE HEADER REPETITION IN A WIRELESS OFDM NETWORK WITH DIFFERENT CHANNEL BANDWIDTHS	US	ISSUED	16/394,490	4/25/2019	US 2019-0253290 A1	10,554,459	2/4/2020
8365-87-PUS- CON-6	Non-transitory computer- readable information storage media for variable header repetition in a wireless OFDM network	US	ISSUED	16/780,589	2/3/2020	US 2020-0169438 A1	10,917,272	2/9/2021
8365-87-PUS- CON-7	HEADER REPETITION IN PACKET-BASED OFDM SYSTEMS	US	PUBLISHED	17/135,801	12/29/2020	US 2021-0119841 A1		