

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”), filed July 1, 2013, qualifies as prior art under at least 35 U.S.C. §§ 102 and/or 103 for the asserted claims of U.S. Patent No. 10,448,430 (“the ’430 patent”), as discussed in detail in the claim chart below.

The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. As such, nothing in Defendants’ claim charts should be construed as an admission regarding infringement, either literally or under the doctrine of equivalents, or as an admission regarding Defendants’ understanding of the proper scope of the asserted claims. Defendants reserve the right to rely on additional citations or sources of evidence that also may be applicable, or that may become applicable in light of claim construction, changes in GComm’s infringement contentions, and/or information obtained during discovery as the case progresses.

To the extent GComm alleges that *Kim* ’068 does not disclose any particular limitation of the asserted claims of the ’430 patent, either expressly or inherently, it would have been obvious to a person of ordinary skill in the art as of the priority date of the ’430 patent to modify *Kim* ’068 and/or to combine the teachings of *Kim* ’068 with other prior art references, including but not limited to the present prior art references cited in the Cover Pleading and the relevant section(s) of claim charts for other prior art references for the ’430 patent in a manner that would have rendered the asserted claims invalid as obvious.

Defendants reserve the right to amend or supplement this claim chart at a later date as more fully set forth in the Cover Pleading.

EXHIBIT B2

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’430 Patent	U.S. Patent Publication No. 2016/0374068 (“<i>Kim</i> ’068”)
1[pre] A random access method, comprising:	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. To the extent the preamble of claim 1 is found to be limiting, <i>Kim</i> ’068 discloses a random access method. <i>See, e.g.</i>, “The present invention relates to a wireless communication system and, more particularly, a method for transmitting and/or receiving a signal using device-to-device (D2D) communication in a wireless communication system and an apparatus for the same.” <i>Kim</i> ’068 at [0001]. “As an example of a mobile communication system to which the present invention is applicable, a 3rd generation partnership project long term evolution (3GPP LTE) (hereinafter, referred to as LTE) communication system is described in brief.” <i>Kim</i> ’068 at [0002]. “FIG. 1 is a diagram schematically illustrating a network structure of an E-UMTS as an exemplary wireless communication system.” <i>Kim</i> ’068 at [0003].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

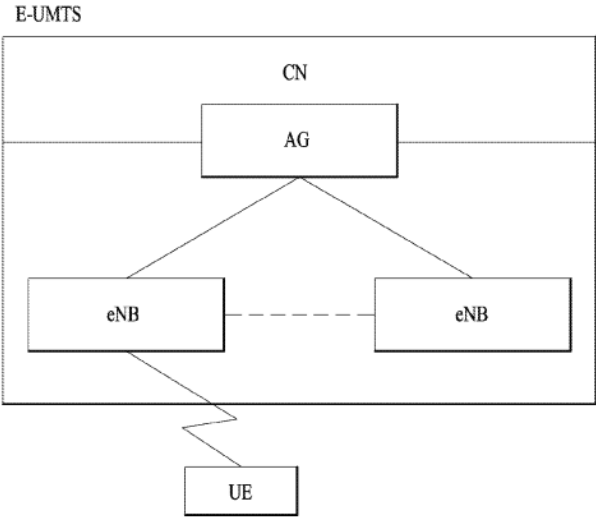
'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	FIG. 1  <pre> graph TD subgraph E_UMTS [E-UMTS] subgraph CN [CN] AG[AG] eNB1[eNB] eNB2[eNB] AG --- eNB1 AG --- eNB2 eNB1 -.- eNB2 end UE[UE] eNB1 --- UE end </pre> “An evolved universal mobile telecommunications system (E-UMTS) is an advanced version of a legacy universal mobile telecommunications system (UMTS) and basic standardization thereof is currently underway in the 3GPP. E-UMTS may be referred to as an LTE system. For details of the technical specifications of UMTS and E-UMTS, see Release 7 and Release 8 of ‘3rd Generation Partnership Project; Technical Specification Group Radio Access Network’.” <i>Kim ’068</i> at [0004]. “Referring to FIG. 1, E-UMTS includes a user equipment (UE), evolved Node Bs (eNode Bs or eNBs), and an access gateway (AG) which is located at an end of an evolved UMTS terrestrial radio access network (E-UTRAN) and connected to an external network. The eNBs may simultaneously transmit multiple data streams for a broadcast service, a multicast service, and/or a unicast service.” <i>Kim ’068</i> at [0005].

EXHIBIT B2

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	“FIG. 3 illustrates physical channels used in a 3GPP system and a general signal transmission method using the same.” <i>Kim ’068</i> at [0034]. FIG. 3 The diagram illustrates the physical channels used in a 3GPP system across four main stages: Initial cell search (S301): Includes PSS/SSS & [DLRS] & PBCH. System information reception (S302): Includes PDCCH/PDSCH (BCCH). Random access procedure (S303-S306): Includes PRACH (S303), PDCCH/PDSCH (S304), PUSCH (S305), and PDCCH/PDSCH (S306). Usual DL/UL Tx/Rx (S307-S308): Includes PDCCH/PDSCH (S307) and PUSCH/PUCCH (S308). S307 also includes DL/UL ACK/NACK and UE CQI/PMI/rank report using PUSCH/PUCCH. “FIGS. 4 and 5 specifically illustrate a random access procedure used in the present invention.” <i>Kim ’068</i> at [0035].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

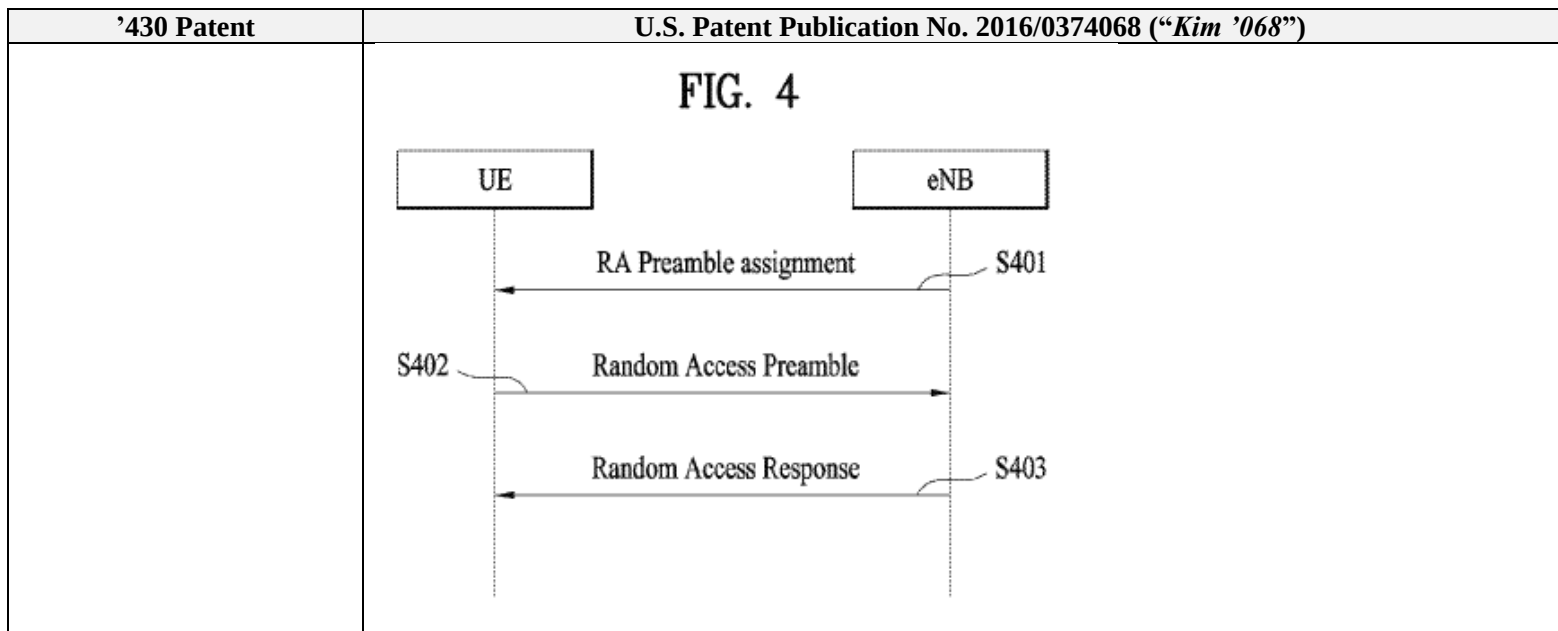


EXHIBIT B2

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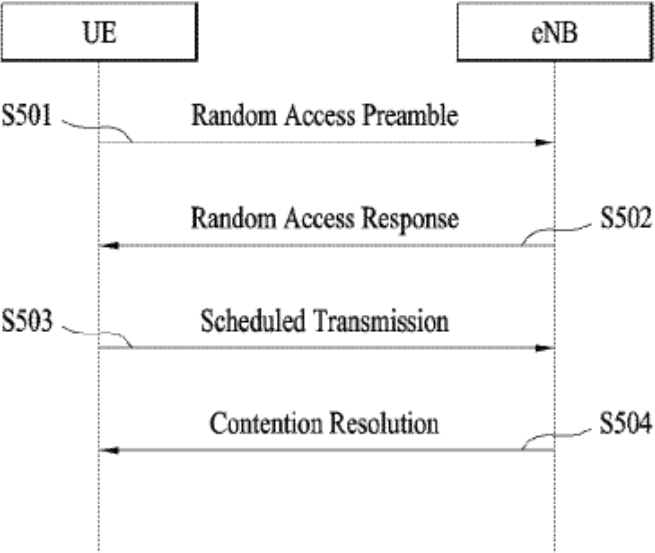
'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	FIG. 5  <pre> sequenceDiagram participant UE participant eNB Note over UE: S501 UE->>eNB: Random Access Preamble Note over eNB: S502 eNB-->>UE: Random Access Response Note over UE: S503 UE->>eNB: Scheduled Transmission Note over eNB: S504 eNB-->>UE: Contention Resolution </pre> “FIGS. 6 and 7 illustrate D2D communication performed through a pseudo-random access procedure according to an embodiment of the present invention.” <i>Kim</i> ’068 [0036].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

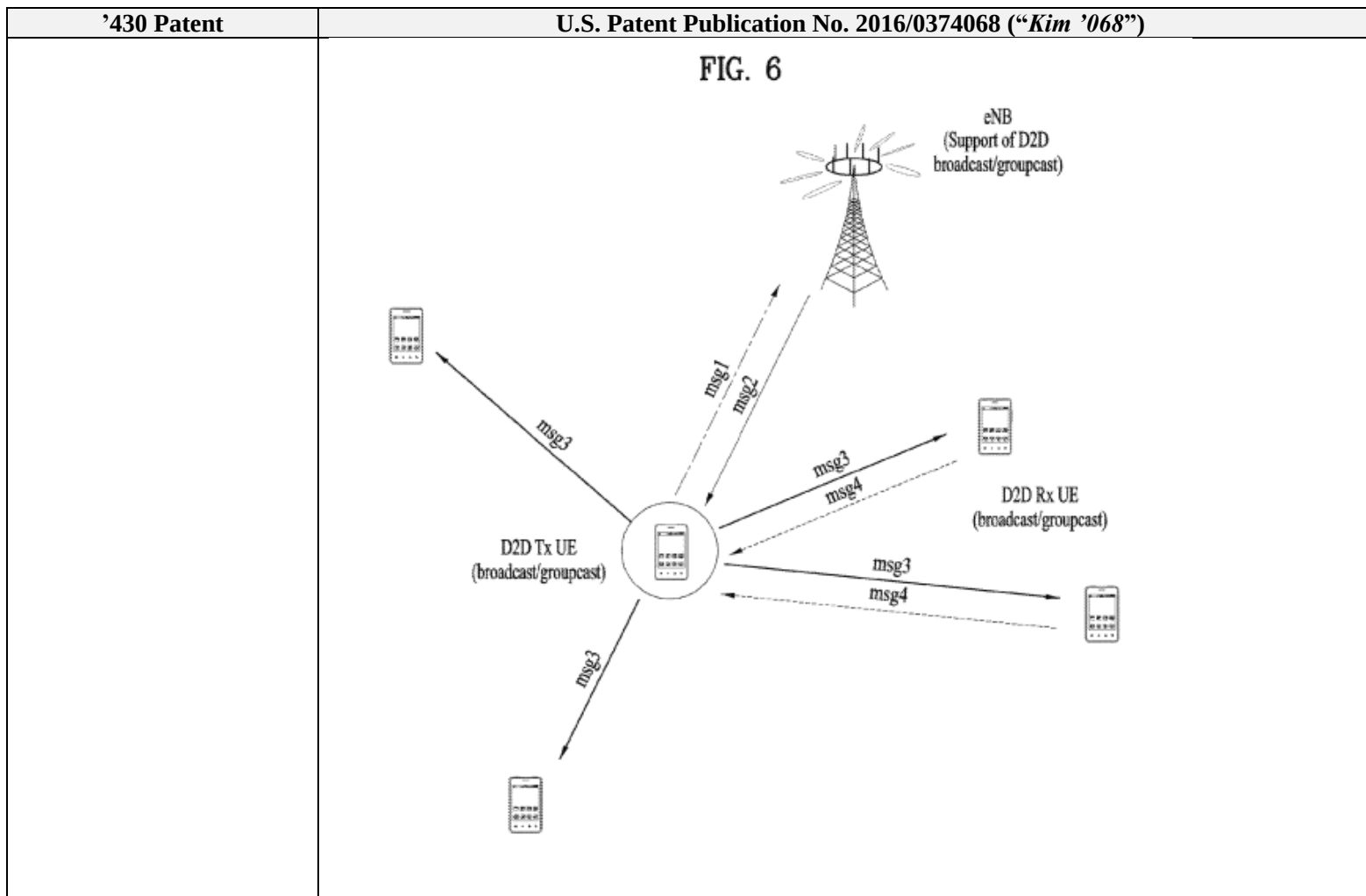
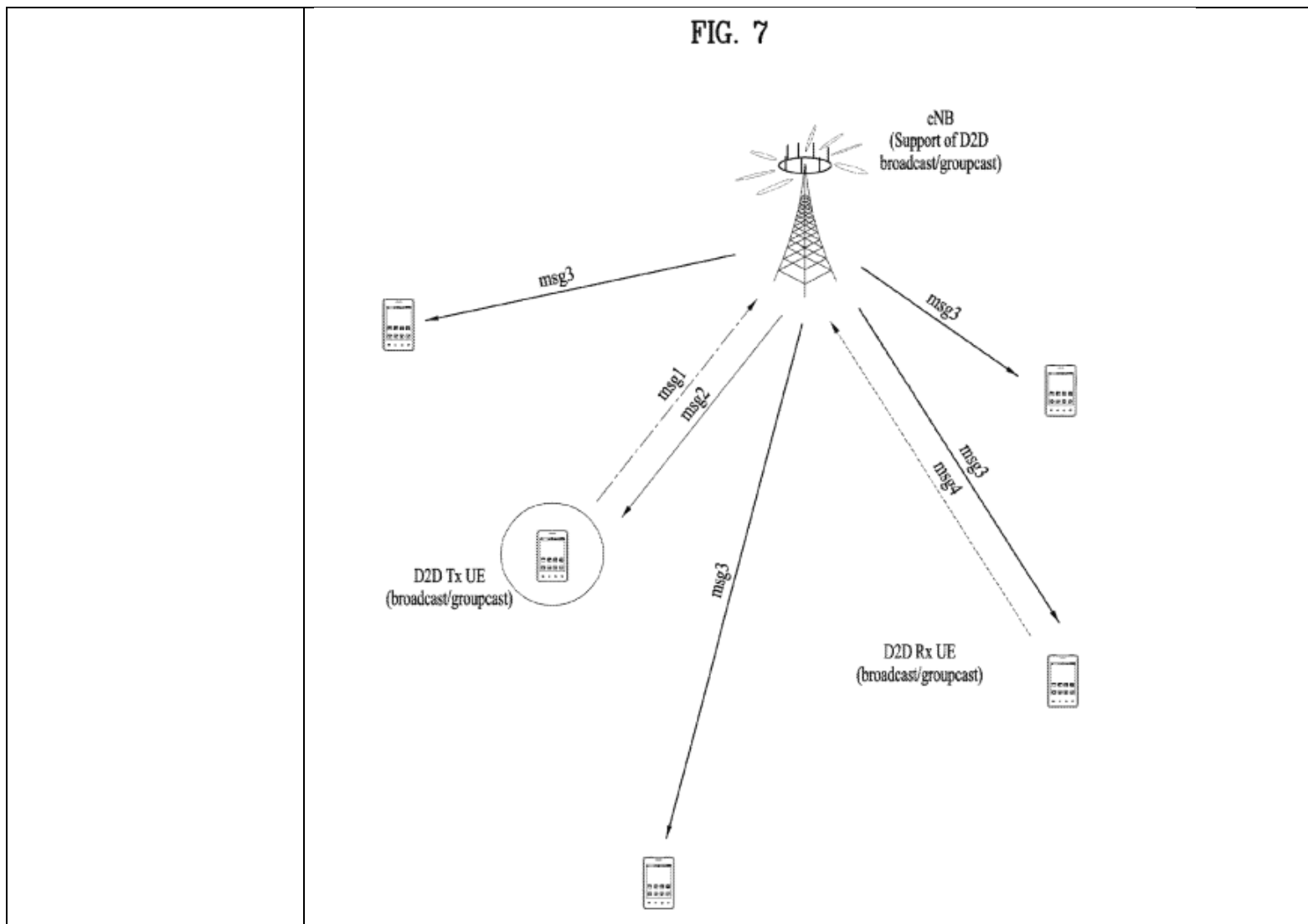


EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068)



PAGE 8 OF 114

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“<i>Kim</i> ’068”)
	“FIG. 8 illustrates D2D communication performed through a pseudo-random access procedure according to another embodiment of the present invention.” <i>Kim</i> ’068 at [0037].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068)

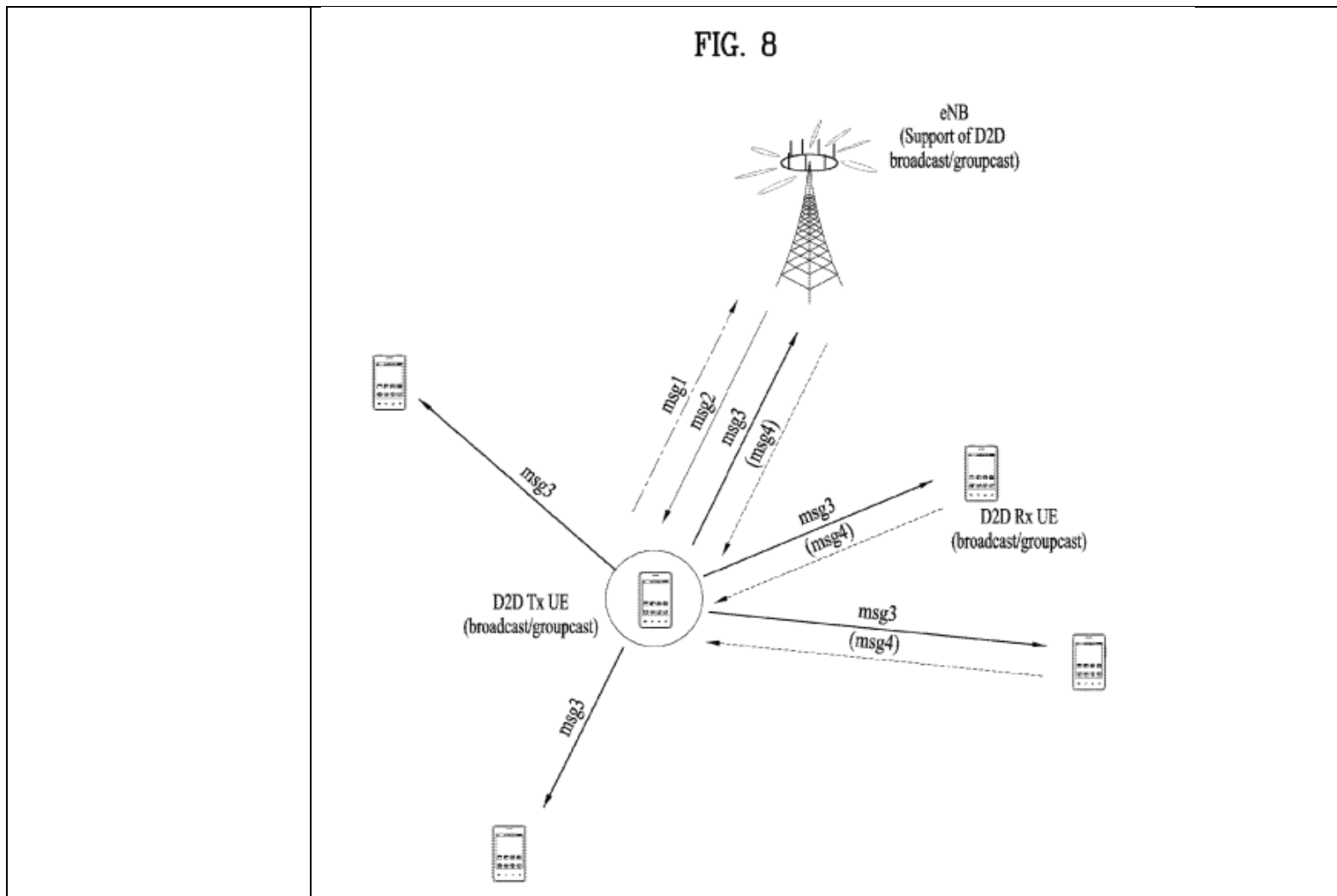


EXHIBIT B2

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’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	“The following techniques, apparatuses, and sys-tems may be applied to a variety of wireless multiple access systems. Examples of the multiple access systems include a code division multiple access (CDMA) system, a frequency division multiple access (FDMA) system, a time division multiple access (TDMA) system, an orthogonal frequency division multiple access (OFDMA) system, a single carrier frequency division multiple access (SC-FDMA) system, and a multicarrier frequency division multiple access (MC FDMA) system. CDMA may be embodied through radio technology Such as universal terrestrial radio access (UTRA) or CDMA2000. TDMA may be embodied through radio technology Such as global system for mobile communica-tions (GSM), general packet radio service (GPRS), or enhanced data rates for GSM evolution (EDGE). OFDMA may be embodied through radio technology Such as institute of electrical and electronics engineers (IEEE) 802.11 (Wi-Fi), IEEE 802.16 (WiMAX), IEEE 802.20, or evolved UTRA (E-UTRA). UTRA is a part of a universal mobile telecommunications system (UMTS). 3rd generation part-nership project (3GPP) long term evolution (LTE) is a part of evolved UMTS (E-UMTS) using E-UTRA. 3GPP LTE-employs OFDMA in DL and SC-FDMA in UL. LTE advanced (LTE-A) is an evolved version of 3GPP LTE. For convenience of description, it is assumed that the present invention is applied to 3GPP LTE/LTE-A. However, the technical features of the present invention are not limited thereto. For example, although the following detailed description is given based on a mobile communication system corresponding to a 3GPP LTE/LTE-A system, aspects of the present invention that are not specific to 3GPP LTE/LTE-A are applicable to other mobile communication systems.” <i>Kim ’068</i> at [0046]. “As described above, to efficiently perform D2D communication, radio resources for UE-to-UE communica-tion need to be efficiently allocated. Particularly, a method for quickly transmitting a signal without delay in emergency is required for D2D communication. The present invention proposes a method to satisfy this requirement.” <i>Kim ’068</i> at [0056]. “To this end, operations in an LTE system to which the present invention is applicable will be reviewed and then a method for efficiently performing D2D communication using a random access procedure (also referred to as a random access channel (RACH) procedure) in the LTE system will be proposed.” <i>Kim ’068</i> at [0057].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

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	“FIG. 3 illustrates physical channels used in a 3GPP system and a general signal transmission method using the same.” <i>Kim ’068</i> at [0058]. “When the UE accesses an eNB for the first time or there is no radio resource for signal transmission, the UE may perform a random access procedure for the eNB (S303 to S306). To this end, the UE may transmit a specific sequence as a preamble through a physical random access channel (PRACH) (S303 and S305) and receive a response message to the preamble through the PDCCH and the PDSCH corresponding to the PDCCH (S304 and S306). In a contention-based random access procedure, a contention resolution procedure may be additionally performed.” <i>Kim ’068</i> at [0061]. “FIGS. 4 and 5 specifically illustrate a random access procedure used in the present invention.” <i>Kim ’068</i> at [0064]. “The UE performs the random access procedure in the following cases. The UE performs the random access procedure in the following cases. The UE performs initial access since there is no radio resource control (RRC) connection to an eNB. The UE accesses a target cell for the first time in a handover procedure. The random access procedure is requested by a command from the eNB. Data to be transmitted on uplink is generated while uplink time synchronization is not established, or a designated radio resource used to request a radio resource is not allocated. A recovery procedure is performed due to radio link failure or handover (HO) failure.” <i>Kim ’068</i> at [0065-70]. “The random access procedure is requested by a command from the eNB.” <i>Kim ’068</i> at [0068]. “In selecting a random access preamble in the LTE system, both a contention-based random access procedure, through which the UE selects one preamble to use within a specific set, and a non-contention-based random access procedure, through which a random access preamble allocated to a specific UE by the eNB is used, are provided. The non-contention-based random access procedure may be used only in the HO procedure or only when the procedure is requested according to a command from the eNB.” <i>Kim ’068</i> at [0071].

EXHIBIT B2

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	“A random access procedure that a UE performs with a specific eNB may include (1) the UE transmitting a random access preamble to the eNB (hereafter, referred to as transmission of ‘a first message (message 1)’ if there is no confusion), (2) receiving a random access response from the eNB in response to the transmitted random access preamble (hereafter, referred to as reception of ‘a second message (message 2)’ if there is no confusion), (3) transmitting a UL message using the information received through the random access response message (hereafter, referred to as transmission of ‘a third message (message 3)’ if there is no confusion) and (4) receiving a message corresponding to the UL message from the eNB (hereafter, referred to as reception of ‘a fourth message (message 4)’ if there is no confusion).” <i>Kim</i> ’068 at [0072]. “FIG. 5 is a diagram illustrating operations of the UE and the eNB performed in the condition-based random access procedure.” <i>Kim</i> ’068 at [0083]. “The procedure described above may appear to be similar to the random access procedure. However, the over-all operation and functions of the procedure described using the term random access procedure or the details of the random access procedure may be different from those of the random access procedure. Unless stated otherwise, the procedure will re-employ the random access procedure and functions.” <i>Kim</i> ’068 at [0104]. “FIGS. 6 and 7 illustrate D2D communication performed through a pseudo-random access procedure according to an embodiment of the present invention.” <i>Kim</i> ’068 at [0106]. “FIG. 8 illustrates D2D communication performed through a pseudo-random access procedure according to another embodiment of the present invention.” <i>Kim</i> ’068 at [0111]. “Hereinafter, a detailed description will be given of configurations of msg1 to msg4 in D2D communication employing the pseudo-random access procedure.” <i>Kim</i> ’068 at [0113]. “The system information for msg1 for D2D communication may have a form similar to PRACH of LTE as shown below. For simplicity, this information will be referred to as D2D-PRACH configuration information, but it may also be assigned other names.” <i>Kim</i> ’068 at [0116].

EXHIBIT B2

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	TABLE 1 D2D-PRACH-Config information elements <pre> D2D-PRACH-ConfigSIB ::= SEQUENCE { rootSequenceIndex INTEGER (0..A), D2d-prach-ConfigInfo d2d-PRACH-ConfigInfo } d2d-PRACH-Config ::= SEQUENCE { rootSequenceIndex INTEGER (0..A), d2d-prach-ConfigInfo d2d-PRACH-ConfigInfo OPTIONAL -- Need ON } D2d-PRACH-ConfigSCell-r10 ::= SEQUENCE { D2d-prach-ConfigIndex-r10 INTEGER (0..B) } D2d-PRACH-ConfigInfo ::= SEQUENCE { D2d-prach-ConfigIndex INTEGER (0..B), highSpeedFlag BOOLEAN, zeroCorrelationZoneConfig INTEGER (0..C), D2d-prach-FreqOffset INTEGER (0..D) } -- ASN1STOP </pre> <i>Kim ’068</i> at [0116].
1[a] sending, by a first User Equipment (UE) in a UE group, a preamble to an evolved Node B (eNB) over a time-frequency resource,	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with.

EXHIBIT B2

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the time-frequency resource comprising a time domain resource and a frequency domain resource;	<i>Kim</i> ’068 discloses sending, by a first User Equipment (UE) in a UE group, a preamble to an evolved Node B (eNB) over a time-frequency resource, the time-frequency resource comprising a time domain resource and a frequency domain resource. See ’430 element [1pre]. In addition, <i>Kim</i> ’068 discloses, e.g.: “The UE is fixed or mobile. The UE is a device that transmits and receives user data and/or various kinds of control information through communication with a base station (BS). The term ‘UE’ may be replaced with ‘terminal equipment’, ‘Mobile Station (MS)’, ‘Mobile Terminal (MT)’, ‘User Terminal (UT)’, ‘Subscriber Station (SS)’, ‘wireless device’, ‘Personal Digital Assistant (PDA)’, ‘wireless modem’, ‘handheld device’, etc. A BS is typically a fixed station that communicates with a UE and/or another BS. The BS exchanges data and control information with a UE and another BS. The term BS’ may be replaced with ‘Advanced Base Station (ABS)’, ‘Node B’, ‘evolved-Node B (eNB)’, ‘Base Transceiver System (BTS)’, ‘Access Point (AP)’, ‘Processing Server (PS)’, etc. In the following description, BS is commonly called eNB.” <i>Kim</i> ’068 at [0006]. “One or more cells are managed by one eNB. A cell is configured to use one of bandwidths of 1.25, 2.5, 5, 10, 15, and 20 MHz to provide a downlink (DL) or uplink (UL) transmission service to multiple UEs. Different cells may be configured to provide different bandwidths. The eNB controls data transmission and reception to and from a plurality of UEs. For DL data, the eNB transmits DL scheduling information to notify a corresponding UE of time/frequency resources through which the data is to be transmitted, coding, data size, and hybrid automatic repeat and request (HARQ)-related information. For UL data, the eNB transmits UL scheduling information to a corresponding UE to inform the UE of available time/frequency resources, coding, data size, and HARQ-related information. An interface for transmitting user traffic or control traffic between eNBs may be used. A core network (CN) may include an AG and a network node for user registration for the UE. The AG manages mobility of the UE on a tracking area (TA) basis, each TA including a plurality of cells.” <i>Kim</i> ’068 at [0007].

EXHIBIT B2

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’430 Patent	U.S. Patent Publication No. 2016/0374068 (“<i>Kim</i> ’068”)
	“Conventionally, the legacy LTE communication scheme mainly considers wireless communication between an eNB and a UE. However, demands for technology enabling direct communication between UEs have recently increased.” <i>Kim</i> ’068 at [0008]. “FIG. 2 is a conceptual diagram illustrating direct communication between UEs.” <i>Kim</i> ’068 at [0009].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

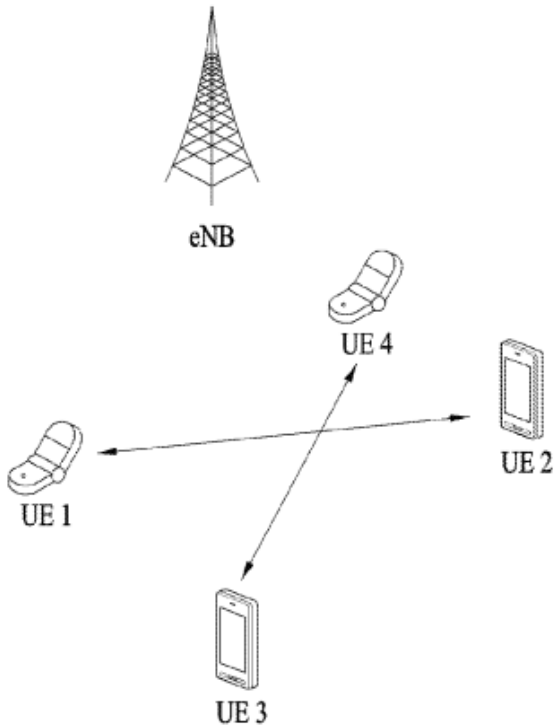
'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	FIG. 2  “Referring to FIG. 2, UE-to-UE direct communication is performed between UE1 and UE2 and between UE3 and UE4. The eNB may control positions of the time/ frequency resources, transmit power and the like for direct communication between UEs through a proper control signal. Direct communication between UEs is referred to as device-to-device (D2D) communication in the following

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

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	description.” <i>Kim</i> ’068 at [0010]. “In the respective aspects of the present invention, the first message or the cluster head decision signal may be transmitted using a reserved preamble sequence.” <i>Kim</i> ’068 at [0019]. “In the respective aspects of the present invention, the reserved preamble sequence may be longer than a random transmission preamble sequence.” <i>Kim</i> ’068 at [0020]. “In another aspect of the present invention, provided herein are a method including receiving the first message or the cluster head decision signal, receiving a second message, and receiving the D2D signal based on the control information contained in the second message, and a user equipment (UE) for implementing the same.” <i>Kim</i> ’068 at [0026]. “FIG. 10 illustrates classification of resources used for a message (e.g., msg1) for requesting resource allocation for transmission of a D2D signal.” <i>Kim</i> ’068 at [0039].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

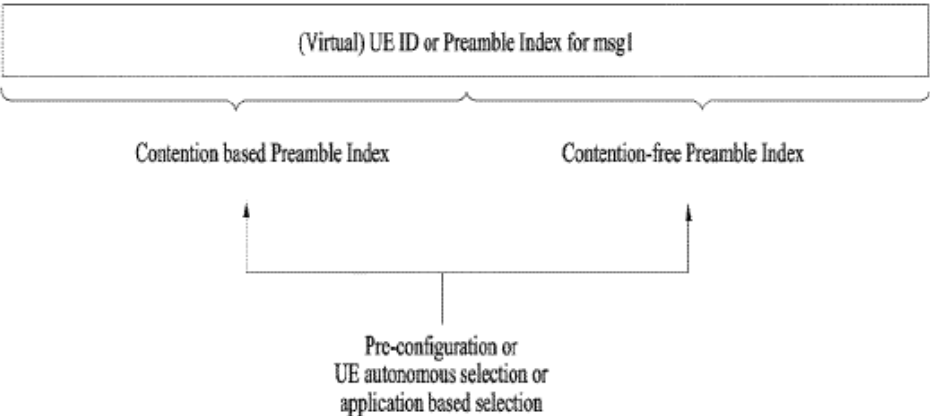
'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	FIG. 10  “FIG. 9 illustrates D2D broadcast/groupcast performed outside coverage.” <i>Kim</i> ’068 at [00038].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

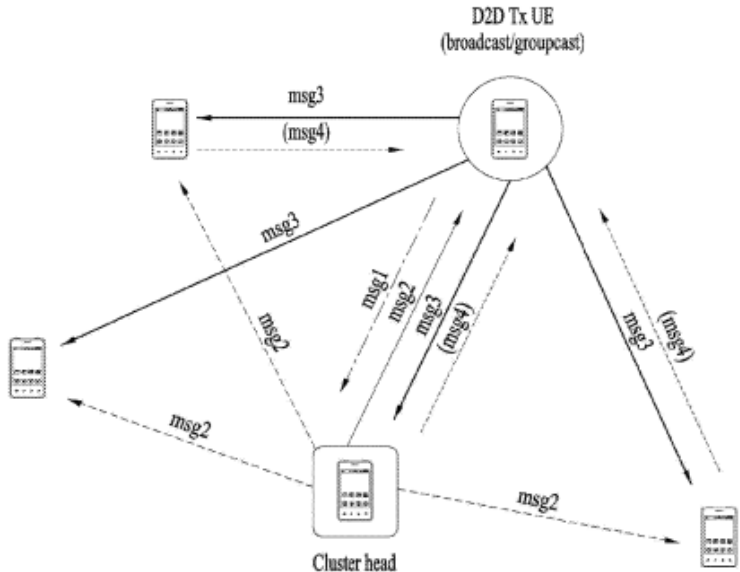
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	FIG. 9  “FIG. 10 illustrates classification of resources used for a message (e.g., msg1) for requesting resource allocation for transmission of a D2D signal.” <i>Kim ’068</i> at [00039]. “In the present invention, a node refers to a fixed point capable of transmitting/receiving a radio signal through communication with a UE. Various types of eNBs may be used as nodes irrespective of the terms thereof. For example, a BS, a node B (NB), an e-node B (eNB), a pico-cell eNB (PeNB), a home eNB (HeNB), a relay, a repeater, etc. may be a node. In addition, the node may not be an eNB. For example, the node may be a radio remote head (RRH) or a radio remote unit (RRU). The RRH or RRU generally has a lower power level than a power level of an eNB. Since the RRH or RRU (hereinafter,

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

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	RRH/RRU) is generally connected to the eNB through a dedicated line Such as an optical cable, cooperative communication between RRH/RRU and the eNB can be smoothly per formed in comparison with cooperative communication between eNBs connected by a radio line. At least one antenna is installed per node. The antenna may mean a physical antenna or mean an antenna port, a virtual antenna, or an antenna group. A node may be referred to as a point. In the multi-node system, the same cell identity (ID) or different cell IDs may be used to transmit/receive signals to/from a plurality of nodes. If the plural nodes have the same cell ID, each of the nodes operates as a partial antenna group of one cell. If the nodes have different cell IDs in the multi-node system, the multi-node system may be regarded as a multi-cell (e.g. a macro-cell/femto-cell/pico-cell) sys-tem. If multiple cells formed respectively by multiple nodes are configured in an overlaid form according to coverage, a network formed by the multiple cells is referred to as a multi-tier network. A cell ID of an RRH/RRU may be the same as or different from a cell ID of an eNB. When the RRH/RRU and the eNB use different cell IDs, both the RRH/RRU and the eNB operate as independent eNBs.” <i>Kim ’068</i> at [0047]. “In the present invention, a cell refers to a prescribed geographical area to which one or more nodes provide a communication service. Accordingly, in the present inven-tion, communicating with a specific cell may mean commu-nicating with an eNB or a node which provides a commu-nication service to the specific cell. In addition, a DL/UL signal of a specific cell refers to a DL/UL signal from/to an eNB or a node which provides a communication service to the specific cell. A node providing UL/DL communication services to a UE is called a serving node and a cell to which UL/DL communication services are provided by the serving node is especially called a serving cell. Furthermore, chan-nel status/quality of a specific cell refers to channel status/ quality of a channel or communication link formed between an eNB or node which provides a communication service to the specific cell and a UE. The UE may measure DL channel state received from a specific node using cell-specific ref-erence signal(s) (CRS(s)) transmitted on a CRS resource and/or channel state information reference signal(s) (CSI RS(s)) transmitted on a CSI-RS resource, allocated by antenna port(s) of the specific node to the specific node. Meanwhile, a 3GPP LTE/LTE-A system uses the concept of a cell in order to manage radio resources and a cell associ-ated with the radio resources is distinguished from a cell of a geographic region.” <i>Kim ’068</i> at [0048].

EXHIBIT B2

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	“Recently, to use a wider frequency band in recent wireless communication systems, introduction of carrier aggregation (or BW aggregation) technology that uses a wider UL/DL BW by aggregating a plurality of UL/DL frequency blocks has been discussed. A carrier aggregation (CA) is different from an orthogonal frequency division multiplexing (OFDM) system in that DL or UL communication is performed using a plurality of carrier frequencies, whereas the OFDM system carries a base frequency band divided into a plurality of orthogonal Subcarriers on a single carrier frequency to perform DL or UL communication. Hereinbelow, each of carriers aggregated by carrier aggregation will be referred to as a component carrier (CC). The CCS may or may not be adjacent to each other in the frequency domain.” <i>Kim ’068</i> at [0049]. “The ‘cell’ associated with the radio resources is defined by combination of downlink resources and uplink resources, that is, combination of DLCC and ULCC. The cell may be configured by downlink resources only, or may be configured by downlink resources and uplink resources. If carrier aggregation is Supported, linkage between a carrier frequency of the downlink resources (or DLCC) and a carrier frequency of the uplink resources (or ULCC) may be indicated by System information. In frequency division duplex (FDD), since the UL operation band is different from the DL operation band, different carrier frequencies are linked to constitute one cell, and SIB2 linkage designates, as a frequency of a UL CC, a frequency different from the frequency of a DL CC which the UE accesses. In other words, in the case of FDD, in a cell constituted by a DLCC and a ULCC linked to the DL CC, the DLCC and the UL CC operate at different frequencies. In time division duplex (TDD), the UL operation band is identical to the DL operation band. Accordingly, one carrier frequency constitutes one cell, and SIB2 linkage designates the frequency of a DL CC which the UE accesses as the frequency of a corresponding.” <i>Kim ’068</i> at [0050]. “In this case, the carrier frequency means a center frequency of each cell or CC. A cell operating on a primary frequency may be referred to as a primary cell (Pcell) or PCC, and a cell operating on a secondary frequency may be referred to as a secondary cell (Scell) or SCC. The carrier corresponding to the Pcell on downlink will be referred to as a downlink primary CC (DL PCC), and the carrier corresponding to the Pcell on uplink will be referred to as an uplink primary CC (ULPCC). A Scell means a cell that may be configured after completion of radio resource control (RRC) connection establishment and used to provide additional radio resources. The Scell may form a set of

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	serving cells for the UE together with the PCell in accordance with capabilities of the UE. The carrier corresponding to the Scell on the downlink will be referred to as downlink secondary CC (DLSCC), and the carrier corresponding to the Scell on the uplink will be referred to as uplink secondary CC (UL SCC). Although the UE is in RRC-CONNECTED state, if it is not configured by carrier aggregation or does not support carrier aggregation, a single serving cell configured by the Pcell only exists.” <i>Kim ’068</i> at [0051]. “A ‘cell’ of a geographic region may be understood as coverage within which a node can provide service using a carrier and a ‘cell’ of a radio resource is associated with bandwidth (BW) which is a frequency range configured by the carrier. Since DL coverage, which is a range within which the node is capable of transmitting a valid signal, and UL coverage, which is a range within which the node is capable of receiving the valid signal from the UE, depends upon a carrier carrying the signal, the coverage of the node may be associated with coverage of the ‘cell’ of a radio resource used by the node. Accordingly, the term ‘cell’ may be used to indicate service coverage of the node sometimes, a radio resource at other times, or a range that a signal using a radio resource can reach with valid strength at other times.” <i>Kim ’068</i> at [0052]. “3GPP LTE/LTE-A standards define DL physical channels corresponding to resource elements carrying information derived from a higher layer and DL physical signals corresponding to resource elements which are used by a physical layer but which do not carry information derived from a higher layer. For example, a physical downlink shared channel (PDSCH), a physical broadcast channel (PBCH), a physical multicast channel (PMCH), a physical control format indicator channel (PCFICH), a physical downlink control channel (PDCCH), and a physical hybrid ARQ indicator channel (PHICH) are defined as the DL physical channels, and a reference signal and a synchronization signal are defined as the DL physical signals. A reference signal (RS), also called a pilot, refers to a special waveform of a predefined signal known to both a BS and a UE. For example, a cell-specific RS (CRS), a UE-specific RS (UE-RS), a positioning RS (PRS), and channel state information RS (CSI-RS) may be defined as DL RSs. Meanwhile, the 3GPP LTE/LTE-A standards define UL physical channels corresponding to resource elements carrying information derived from a higher layer and UL physical signals corresponding to resource elements which are used by a physical layer but which do not carry information derived from a higher layer. For example, a physical uplink shared channel (PUSCH), a

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	physical uplink control channel (PUCCH), and a physical random access channel (PRACH) are defined as the UL physical channels, and a demodulation reference signal (DMRS) for a UL control/ data signal and a Sounding reference signal (SRS) used for UL channel measurement are defined as the UL physical signals.” <i>Kim ’068</i> at [0053]. “In the present invention, a physical downlink control channel (PDCCH), a physical control format indicator channel (PCFICH), a physical hybrid automatic retransmit request indicator channel (PHICH), and a physical downlink shared channel (PDSCH) refer to a set of time-frequency resources or resource elements (REs) carrying downlink control information (DCI), a set of time-frequency resources or REs carrying a control format indicator (CFI), a set of time-frequency resources or REs carrying downlink acknowledgement (ACK)/negative ACK (NACK), and a set of time-frequency resources or REs carrying downlink data, respectively. In addition, a physical uplink control channel (PUCCH), a physical uplink shared channel (PUSCH) and a physical random access channel (PRACH) refer to a set of time-frequency resources or REs carrying uplink control information (UCI), a set of time-frequency resources or REs carrying uplink data and a set of time-frequency resources or REs carrying random access signals, respectively. In the present invention, in particular, a time-frequency resource or RE that is assigned to or belongs to PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/PRACH is referred to as PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/ PRACH RE or PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/PRACH time-frequency resource, respectively. Therefore, in the present invention, PUCCH/PUSCH/ PRACH transmission of a UE is conceptually identical to UCI/uplink data/random access signal transmission on PUSCH/PUCCH/PRACH, respectively. In addition, PDCCH/PCFICH/PHICH/PDSCH transmission of an eNB is conceptually identical to downlink data/DCI transmission on PDCCH/PCFICH/PHICH/PDSCH, respectively.” <i>Kim ’068</i> at [0054]. “In addition, in the present invention, a PBCH/(e) PDCCH/PDSCH/PUCCH/PUSCH region refers to a time frequency resource region to which PBCH/(e)PDCCH/ PDSCH/PUCCH/PUSCH has been mapped or may be mapped.” <i>Kim ’068</i> at [0055].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	“When the UE accesses an eNB for the first time or there is no radio resource for signal transmission, the UE may perform a random access procedure for the eNB (S303 to S306). To this end, the UE may transmit a specific sequence as a preamble through a physical random access channel (PRACH) (S303 and S305) and receive a response message to the preamble through the PDCCH and the PDSCH corresponding to the PDCCH (S304 and S306). In a contention-based random access procedure, a contention resolution procedure may be additionally performed.” <i>Kim ’068</i> at [0061]. “Control information that the UE transmits to the eNB or receives from the eNB through uplink includes a UL/DL acknowledgement (ACK)/negative ACK (NACK) signal and channel state information (CSI) Such as a channel quality indicator (CQI), a precoding matrix (PMI) and a rank indicator (RI). For the 3GPP LTE system, the UE may transmit the ACK/NACK signal and only control information (UCI) such as the CSI over a PUSCH and/or PUCCH.” <i>Kim ’068</i> at [0063]. “In selecting a random access preamble in the LTE system, both a contention-based random access procedure, through which the UE selects one preamble to use within a specific set, and a non-contention-based random access procedure, through which a random access preamble allocated to a specific UE by the eNB is used, are provided. The non-contention-based random access procedure may be used only in the HO procedure or only when the procedure is requested according to a command from the eNB.” <i>Kim ’068</i> at [0071]. “A random access procedure that a UE performs with a specific eNB may include (1) the UE transmitting a random access preamble to the eNB (hereafter, referred to as transmission of ‘a first message (message 1)’ if there is no confusion), (2) receiving a random access response from the eNB in response to the transmitted random access preamble (hereafter, referred to as reception of ‘a second message (message 2)’ if there is no confusion), (3) transmitting a UL message using the information received through the random access response message (hereafter, referred to as transmission of ‘a third message (message 3)’ if there is no confusion) and (4) receiving a message corresponding to the UL message from the eNB (hereafter, referred to as reception of ‘a fourth message (message 4)’ if there is no confusion).” <i>Kim ’068</i> at [0072]. “(1) Assignment of a Random Access Preamble” <i>Kim ’068</i> at [0073].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	“As described above, the non-contention-based random access procedure may be performed (1) in the HO procedure, and (2) when the procedure is requested by a command from the eNB. Of course, the condition-based random access procedure may also be performed in both cases.” <i>Kim ’068</i> at [0074]. “To ensure the non-contention-based random access procedure, it is important to receive a designated random access preamble which has no possibility of collision from the eNB. The random access preamble may be indicated to the UE through an HO command or a PDCCH command. Thereby, the random access preamble is assigned to the UE (S401).” <i>Kim ’068</i> at [0076]. “(2) Transmission of Message 1” <i>Kim ’068</i> at [0077]. “After the UE is assigned a random access preamble solely designated thereto, the UE transmits the designated random access preamble to the eNB (S402).” <i>Kim ’068</i> at [0078]. “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0079]. “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080]. “The random access preamble ID is needed for a random access response since one random access response contains random access response information for one or more UEs. That is, it is necessary to announce a UE for which the UL grant, the temporary C-RNTI and the TAC are valid. In this step, it is assumed that the UE selects a random access preamble ID coinciding with a random access pre-able the UE has selected in step S402.” <i>Kim ’068</i> at [0081]. “(1) Transmission of Message 1” <i>Kim ’068</i> at [0084].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	“A UE may randomly select a random access pre-amble from a set of random access preambles indicated through system information or an HO command, and select and transmit a physical RACH (PRACH) resource on which the random access preamble may be transmitted (S501).” <i>Kim ’068</i> at [0085]. “Random access response information is received using a method similar to the method used in the non-contention-based random access procedure. That is, after transmitting the random access preamble as performed in step S401, the UE attempts to receive a random access response thereof within a random access response reception window indicated through the system information or an HO command by an eNB, and receives corresponding RA-RNTI information (S402). Thereby, the UE may receive a UL grant, a temporary C-RNTI and a TAC.” <i>Kim ’068</i> at [0087]. “Resources for D2D communication may be assigned by an eNB. To this end, a transmission (Tx) UE performing D2D communication may make a request to the eNB for a radio resource, and the eNB may assign a resource in response. Thereby, the Tx UE may transmit signals to one or more reception (RX) UES through the assigned resource. In the following description, a method for a Tx UE to randomly access an eNB in a manner different from the aforementioned typical D2D communication or in a manner similar to the random access procedure to initiate D2D communication is proposed.” <i>Kim ’068</i> at [0093]. “In one embodiment of the present invention, it is proposed that direct communication between UEs be implemented in a manner of broadcast, groupcast or group communication service by changing messages 1 to 4 of the legacy random access procedure as described below. Hereinafter, for simplicity of description, message 1, message 2, message 3 and message 4 are expressed as msg1, msg2, msg3 and msg4, respectively.” <i>Kim ’068</i> at [0094]. “Msg1 (Step 1):” <i>Kim ’068</i> at [0096]. “Step 1 may be defined as a signal announcing that broadcast/groupcast signal transmission (to be implemented in step 3) will be attempted according to a rule that is subsequently determined. Herein, the aforementioned signal may be referred to as msg1 for simplicity. The signal may be delivered from

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	a D2D UE to a specific eNB. According to a method, other D2D UEs may receive or overhear msg1.” <i>Kim ’068</i> at [0097]. “In FIGS. 6 and 7, a Tx UE may transmit, to an eNB, msg1 thereof similar to a random access preamble in a preconfigured resource interval to initiate D2D communication. The eNB receiving msg1 of the Tx UE may be a serving eNB providing a service to the Tx UE, and may support D2D communication broadcast/groupcast of the TX UE.” <i>Kim ’068</i> at [0107]. “In FIGS. 6 and 7, the eNB may transmit msg2 containing information about, for example, resource assignment for transmission of msg3 of the Tx UE to the Tx UE in response to msg1.” <i>Kim ’068</i> at [0108]. “According to embodiments of the present invention, it is proposed that a TX UE randomly select a signature from among predetermined signatures received through system information as in the case of the random access preamble of LTE and transmit msg1 through a resource randomly selected from among predetermined time-frequency resource.” <i>Kim ’068</i> at [0115]. “In the case of LTE RACH, a UE having performed initial transmission of msg1 is designed to monitor msg2 and transmit corresponding msg3. According to the method of this embodiment, msg3 is intended to be broadcast to Rx UEs, and therefore the Rx UEs will not receive msg1, nor will the Rx UEs attempt to monitor msg2. Furthermore, the Rx UEs may not know the fact that the Tx UE has sent msg3, nor attempt to monitor and receive msg3. In particular, the Rx UEs should receive msg3, which is usually transmitted by a UE.” <i>Kim ’068</i> at [0157]. “FIG. 9 illustrates D2D broadcast/groupcast performed outside coverage.” <i>Kim ’068</i> at [0184]. “Referring to FIG. 9, a UE having a message to broadcast is referred to as a D2D broadcast/groupcast Tx UE, in short, a Tx UE, and a UE receiving the broadcast message is referred to as a D2D broadcast/groupcast Rx UE, in short, a Rx UE. The Tx UE transmits msg1, which serves to request broadcast scheduling, to a cluster head, which is partially in charge of resource management/coordination, in order to be assigned a resource consisting of one of time, frequency,

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	sequence (code) and a combination thereof for delivery of the broadcast message. The form of Msg1 may be the same as or similar to that of an RACH preamble.” <i>Kim ’068</i> at [0185]. “FIG. 10 illustrates classification of resources used for a message (e.g., msg1) for requesting resource allocation for transmission of a D2D signal.” <i>Kim ’068</i> at [0186]. “When P preamble sequences are given, some of the preamble sequences may be used for contention-based pre-amble transmission and the other preamble sequences may be used for non-contention-based preamble transmission. For contention-based transmission, a preamble (sequence index) resource for transmission is randomly selected from a predetermined preamble (sequence index) set. On the other end, for non-contention-based transmission, a preamble (sequence index) resource may be pre-designated/pre-assigned, or may need to be designed such that the resource is recognized explicitly or implicitly by a UE according to a transmission resource region (e.g. t id, f id), a UE ID, a UE group (ID), a UE priority index, and the like. For example, when msg1 is transmitted through a specific resource region, a preamble (sequence) index may be determined according to the position of the resource region. The UE may be allowed to select and apply either non-contention-based transmission or condition-based transmission without constraint. Alternatively, either non-contention-based transmission or condition-based transmission may be automatically preconfigured according to the UE application. For example, when the UE makes an emergency call, the UE may be preconfigured or fixed to attempt transmission using a contention-free source. Alternatively, a resource for transmission may be differently assigned depending on the cluster group in order to minimize collision.” <i>Kim ’068</i> at [0187]. “Transmission of msg1 may be performed using a pre-designated time and resource (as in the case of LTE RACH access slot pre-configuration, namely PRACH reconfiguration), or may be performed using a time and resource determined based on a unique attribute (e.g., ID) of the UE. Alternatively, transmission may be performed based on information broadcast by the cluster head with a periodicity. For example, if an RX UE detects a specific cluster head and desires to operate in a group to which the cluster head belongs, the UE identifies a resource for a Tx UE to use to perform broadcast by monitoring the broadcast information of the cluster head. The cluster head may transmit D2D access configuration information for msg1 through a beacon, a synchronization channel, or a broadcast

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	channel. This operation may be similar to a preliminary procedure through which the PRACH configuration should be received before transmission of the PRACH preamble. Meanwhile, configuration information containing timing information about msg1, msg2, msg3 and msg4 may be pre-provided to all D2D UEs. This method may be implemented through operation and management (OAM) or a broadcast signal.” <i>Kim ’068</i> at [0188]. “One method to resolve collision may be to use more kinds of sequences than the legacy RACH preamble to reduce collision possibility. As a long sequence, CAZAC sequence series, a UE ID-embedded CAZAC sequence or a Zadoff-chu sequence may be used. Although a problem such as ID redundancy may occur, a processing procedure such as hashing, which means mapping multiple UE IDs onto one new ID, may be applied to UE IDs to obtain a virtual ID or hashing ID which is shorter in length than the long sequence. Alternatively, contention resolution may be implemented using a CAZAC or Zadoff-chu sequence generated based on the obtained ID. When the length of the sequence increases, complexity of the receiver also increases. However, if a UE ID of a longer sequence is introduced to the preamble and transmitted, the number of preamble sequences increases, and therefore the probability of collision with msg1 which occurs due to random selection of the same sequence index in the msg1 step is greatly reduced. Accordingly, latency resulting from contention resolution performed in the msg4 step may be greatly reduced. In operating broadcast signals based contention, reduction of latency is particularly required for an emergency broadcast signal.” <i>Kim ’068</i> at [0194]. “In a normal situation, the legacy RACH procedure may be utilized as much as possible. That is, for emergency broadcast, a separate preamble sequence may be used. Alternatively, a preamble sequence for emergency may be reserved. However, if the multiple UEs recognize an emergency situation and attempt emergency broadcast simultaneously, namely if msg1 transmission is simultaneously attempted, collision is unavoidable due to a restriction according to the number of reserved sequences.” <i>Kim ’068</i> at [0195]. “In checking the control part error, control information in a format different from that of PDCCH/EPDCCH may be delivered. Further, the control part may be configured in the format of a preamble and a message, and may employ a basic configuration unit (e.g., a resource element group

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	(REG), a control channel element (CCE), an enhanced CCE (e CCE), an aggregation method and a mapping method which are different from those for the PDCCH/EPDCCH.” <i>Kim ’068</i> at [0223]. “Referring to FIG. 14, since the D2D broadcast Tx UE within the coverage, simply referred to as a Tx UE, has a connection with an eNB, the Tx UE may signal that the UE is in an emergency situation and secure a resource on which transmission of a broadcast signal is possible. For example, the Tx UE may signal the emergency situation by performing transmission using a resource or preamble index reserved when msg1 was transmitted. In addition, the Tx UE may be assigned a resource through msg2, and transmit msg3. Thereby, the Tx UE may send an emergency message without suffering collision or latency.” <i>Kim ’068</i> at [0231]. “The embodiments of the present invention are applicable to an eNB, a UE, or other devices in a wireless communication system. What is claimed is: 1. A method for transmitting a device-to-device (D2D) signal by a user equipment (UE) positioned outside a network, the method comprising: transmitting a first message to a cluster head of a cluster containing a plurality of UEs using a preconfigured resource; receiving, from the cluster head, a second message co-taining control information for transmission of the D2D signal; and transmitting the D2D signal based on the control infor-mation.” <i>Kim ’068</i> at [0246], [claim 1]. “2. The method according to claim 1, wherein the first message is transmitted using a preamble sequence reserved for the D2D signal.” <i>Kim ’068</i> at [claim 2]. “3. The method according to claim 1, wherein the first message is transmitted using a preamble sequence reserved for the D2D signal.” <i>Kim ’068</i> at [claim 3].
[1b] monitoring, by at least one of the first UE or a second UE in the UE group, a Random Access Response (RAR) corresponding to the preamble and sent by the eNB, wherein the first UE is	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim ’068</i> discloses monitoring, by at least one of the first UE or a second UE in the UE group, a Random Access Response (RAR) corresponding to the preamble and sent by the eNB, wherein the first UE is at least one UE in the UE group, and the second UE is all or some UEs in the UE group.

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
at least one UE in the UE group, and the second UE is all or some UEs in the UE group; and	<i>See ’430 elements [1pre], [1a]. In addition, Kim ’068 discloses, e.g.:</i> “In another aspect of the present invention, provided herein are a method including receiving the first message or the cluster head decision signal, receiving a second message, and receiving the D2D signal based on the control information contained in the second message, and a user equipment (UE) for implementing the same.” <i>Kim ’068</i> at [0026]. “When the UE accesses an eNB for the first time or there is no radio resource for signal transmission, the UE may perform a random access procedure for the eNB (S303 to S306). To this end, the UE may transmit a specific sequence as a preamble through a physical random access channel (PRACH) (S303 and S305) and receive a response message to the preamble through the PDCCH and the PDSCH corresponding to the PDCCH (S304 and S306). In a contention-based random access procedure, a contention resolution procedure may be additionally performed.” <i>Kim ’068</i> at [0061]. “The UE which has performed the above procedures may receive a PDCCH/PDSCH signal (S307) and transmit a PUSCH/PUCCH signal (S308) according to a general UL/DL signal transmission procedure. In particular, the UE receives downlink control information (DCI) through the PDCCH. Herein, the CCI includes control information such as resource allocation information for the UE and comes in a different format according to the purpose thereof.” <i>Kim ’068</i> at [0062]. “Control information that the UE transmits to the eNB or receives from the eNB through uplink includes a UL/DL acknowledgement (ACK)/negative ACK (NACK) signal and channel state information (CSI) Such as a channel quality indicator (CQI), a precoding matrix (PMI) and a rank indicator (RI). For the 3GPP LTE system, the UE may transmit the ACK/NACK signal and only control information (UCI) such as the CSI over a PUSCH and/or PUCCH.” <i>Kim ’068</i> at [0063]. “A random access procedure that a UE performs with a specific eNB may include (1) the UE transmitting a random access preamble to the eNB (hereafter, referred to as transmission of ‘a first message (message 1)’ if there is no confusion), (2) receiving a random access response from the eNB in response to the transmitted random access preamble (hereafter, referred to as reception of ‘a second

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	message (message 2)’ if there is no confusion), (3) transmitting a UL message using the information received through the random access response message (hereafter, referred to as transmiss-ion of ‘a third message (message 3)’ if there is no confu-sion) and (4) receiving a message corresponding to the UL message from the eNB (hereafter, referred to as reception of ‘a fourth message (message 4)’ if there is no confusion).” <i>Kim ’068</i> at [0072]. “Reception of Message 2” <i>Kim ’068</i> at [0079]. “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all moni-tored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080]. “The random access preamble ID is needed for a random access response since one random access response contains random access response information for one or more UEs. That is, it is necessary to announce a UE for which the UL grant, the temporary C-RNTI and the TAC are valid. In this step, it is

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	assumed that the UE selects a random access preamble ID coinciding with a random access preamble the UE has selected in step S402.” <i>Kim ’068</i> at [0081]. “In the non-contention-based random access procedure, when the UE receives random access response information, the UE may terminate the random access procedure, determining that the random access procedure has been normally performed.” <i>Kim ’068</i> at [0082]. “(2) Reception of Message 2” <i>Kim ’068</i> at [0086]. “Random access response information is received using a method similar to the method used in the non contention-based random access procedure. That is, after transmitting the random access preamble as performed in step S401, the UE attempts to receive a random access response thereof within a random access response reception window indicated through the system information or an HO command by an eNB, and receives corresponding RA-RNTI information (S402). Thereby, the UE may receive a UL grant, a temporary C-RNTI and a TAC.” <i>Kim ’068</i> at [0087]. “If the UE receives a valid random access response, the UE processes the information included in the random access response. That is, the UE applies the TAC and stores the temporary C-RNTI. In addition, the UE transmits data (i.e., message 3) to the eNB using the UL grant (S403). Message 3 should include an ID of the UE. This is because the eNB cannot determine which UEs perform the random access procedure in the contention-based random access procedure and the UEs need to be identified for future contention resolution.” <i>Kim ’068</i> at [0089]. “After transmitting the data including the ID of the UE through the UL grant included in the random access response, the UE awaits instruction from the eNB for contention resolution. That is, the UE attempts to receive a PDCCH in order to receive a specific message (S404). Two methods for receiving the PDCCH have been discussed. As described above, if message 3 is transmitted according to the UL grant using the ID of the UE or the cell ID, the UE may attempt to receive a PDCCH using the cell ID thereof. If the ID is a unique ID, the UE may attempt to receive a PDCCH using the temporary C-RNTI included in the random access response. In the former case, if the UE receives the PDCCH using the cell ID thereof before the contention resolution timer expires, the UE terminates the random access procedure, determining that the random access procedure has been normally performed. In the latter

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	case, if the UE receives a PDCCH using the temporary C-RNTI before the contention resolution timer expires, the UE checks the data delivered through the PDSCH indicated by the PDCCH. If the data contains the unique ID of the UE, the UE terminates the random access procedure, determining that the random access procedure has been normally performed.” <i>Kim ’068</i> at [0092]. “Resources for D2D communication may be assigned by an eNB. To this end, a transmission (Tx) UE performing D2D communication may make a request to the eNB for a radio resource, and the eNB may assign a resource in response. Thereby, the Tx UE may transmit signals to one or more reception (RX) UES through the assigned resource. In the following description, a method for a Tx UE to randomly access an eNB in a manner different from the aforementioned typical D2D communication or in a manner similar to the random access procedure to initiate D2D communication is proposed.” <i>Kim ’068</i> at [0093]. “In one embodiment of the present invention, it is proposed that direct communication between UEs be implemented in a manner of broadcast, groupcast or group communication service by changing messages 1 to 4 of the legacy random access procedure as described below. Hereinafter, for simplicity of description, message 1, message 2, message 3 and message 4 are expressed as msg1, msg2, msg3 and msg4, respectively.” <i>Kim ’068</i> at [0094]. “Msg2 (Step 2):” <i>Kim ’068</i> at [0098]. “Step 2 is a response of the eNB to Step 1. Step 2 delivers information (e.g., resource assignment, power control, timing lapse, cyclic prefix (CP) length, and the like) which is needed for the D2D UE having requested Step 1 to transmit a broadcast/groupcast signal corresponding to msg3. Herein, the signal may be referred to as msg2.” <i>Kim ’068</i> at [0099]. “Step 3 is a procedure in which the D2D broadcast/groupcast Tx UE having requested Step 1 delivers a broadcast/groupcast signal to a D2D Rx UE. In some cases, the signal may be delivered only to a restricted D2D Rx UE or UE group. That is, the subject to receive the broadcast/groupcast signal may be limited. Further, in some cases, an eNB may be allowed to receive the signal and perform a proper

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	operation (e.g., relay or repetitive transmission) in response. Herein, the signal may be referred to as msg3.” <i>Kim ’068</i> at [0101]. “In FIGS. 6 and 7, the eNB may transmit msg2 containing information about, for example, resource assign-ment for transmission of msg3 of the Tx UE to the Tx UE in response to msg1.” <i>Kim ’068</i> at [0108]. “In the example illustrated in FIG. 6, the Tx UE receives msg2 and transmits msg3 to RX UES of a prede-termined group. That is, in the example of FIG. 6, the Tx UE may directly deliver msg3 to RX UEs using resources assigned through msg2, without intervention of the eNB. When necessary, the RX UEs receiving msg3 may deliver msg4 to the Tx UE to signal whether or not reception of msg3 is successful.” <i>Kim ’068</i> at [0109]. “According to embodiments of the present invention, it is proposed that a Tx UE randomly select a signature from among predetermined signatures received through system information as in the case of the random access preamble of LTE and transmit msg1 through a resource randomly selected from among predetermined time-frequency resources.” <i>Kim ’068</i> at [0115]. “A. Content of a msg2 scheduling command for broadcast/groupcast (Very simplified) resource allocation information (Very simplified or truncated) modulation and coding scheme (MCS) Hopping flag Priority indicator (for an emergency situation) Power control command (or fixed/maximum power value (configurable value) as will described later) Timing lapse or partial time lapse information In-band emission information, when necessary UE ID-based processing Groupcast HARQ information Priority counting information (fairness information) Other field(s)” <i>Kim ’068</i> at [0120-0131].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	“B. Content of a msg2 scheduling command for normal scheduling (Very simplified) resource allocation information (Very simplified or truncated) MCS Hopping flag Priority indicator (for an emergency situation) Power control command (or fixed/maximum power value (configurable value) as will described later) Timing lapse or partial time lapse information In-band emission information, when necessary UE ID-based processing Groupcast HARQ information Priority counting information (fairness information) Other field(s)” <i>Kim ’068</i> at [0132-0143]. “If a random access response (RAR)-based RACH scheduling command of the legacy RACH procedure is used, the following fields may be formed to serve other purposes.” <i>Kim ’068</i> at [0144]. “20-Bit UL Grant (Random Access Response Grant) Hopping flag—1 bit Allocation of a resource block having a fixed size—10 bits Truncated MCS—4 bits Transmit power control (TPC) command for PUSCH transmission—3 bits UL delay—1 bit CSI request—1 bit” <i>Kim ’068</i> at [0145]. “In the case of LTE RACH, a UE having performed initial transmission of msg1 is designed to monitor msg2 and transmit corresponding msg3. According to the method of this embodiment, msg3 is intended to be broadcast to RX UEs, and therefore the RX UEs will not receive msg1, nor will the RX UEs attempt to monitor msg2. Furthermore, the RX UEs may not know the fact that the Tx UE has sent msg3, nor attempt to monitor and receive msg3. In particular, the RX UEs should receive msg3, which is usually transmitted by a UE.” <i>Kim ’068</i> at [0157].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	“Accordingly, in order to receive msg3, a special action is to be taken in advance. In particular, information for decoding and demodulating msg3 is necessary. For this reason, it is preferable for the Rx UEs to receive msg2, which serves to approve scheduling of msg3. That is, it is preferable to deliver, to the RX UEs, information capable of executing decoding and demodulation of msg3 (resource allocation, MCS, HARQ, transmission time, timing lapse, CP length, emergency indicator, hopping indicator, priority indicator, number of msg3 transmissions, retransmission timing, a HARQ response method, etc.) through msg2. In addition, before the msg2 and information for decoding and demodulation are delivered, the RX UEs need to receive msg2. Accordingly, it is preferable to pre-signal information about a time at which msg2 is transmitted or is likely to be transmitted, RNTI-related information (e.g., RA-RNTI for demasking PDCCH for msg2 if the PDCCH is masked with an RNTI, a range of RNTI values reserved for a D2D Tx UE or a certain allocated value), a Tx UE ID (when necessary), and information about msg1 of the TX UE (e.g., a time frequency resource index, a subframe, a radio frame, a UE ID, an IMSI), particularly, information used in scrambling and masking msg2.” <i>Kim</i> ’068 at [0158]. “Alternatively, information (a fixed or determined value) about a subframe in which MSG2 is transmitted may be pre-signaled to the RX UES in a broadcast manner, and a subframe or a radio frame configured in this way may need to be persistently monitored to decode and demodulate msg3.” <i>Kim</i> ’068 at [0159]. “Next, if msg2 is received, it is assumed that msg3 has been normally transmitted. Msg3 may be delivered from a Tx UE to an eNB and Rx UEs. Once the eNB receives msg3, the eNB may deliver msg4 to the Tx UE to signal whether or not reception is successful. Similarly, in the case of groupcast, Rx UEs receiving msg3 may transmit msg4 (wherein msg4 is a message delivered to the Tx UE by the Rx UEs and may be identical to or different from a message which is delivered to the Tx UE by the eNB) to signal whether or not reception is successful. In the case of broadcast, the Rx UEs may not perform msg4 transmission. Alternatively, the Rx UEs may deliver, to the eNB, information indicating whether or not reception of msg4 is successful, and the eNB may collect the information and deliver the same to the Tx UE. In this method, it is assumed that the eNB is capable of receiving signals from all Rx UEs relatively well. In this case, the eNB may become a device to finally determine whether or

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	not msg3 is received. If msg3 is not properly delivered, the eNB may re-schedule msg2 such that msg3 transmission is attempted.” <i>Kim ’068</i> at [0162]. “Although a PDCCH for msg4 is monitored, the PDCCH (hereinafter, referred to as msg4 PDCCH) may not be detected. This is the case where a msg3 fails to be received. Failure of reception of msg3 may occur in two cases. In one case, msg3 may not be properly received when msg3 collision occurs (e.g., when one or more Tx UEs transmit MSG 1, receive a msg2 response simultaneously, and then transmit msg3 respectively). In the other case, msg3 is not properly received as the radio channel for msg3 transmission is not good. A simple method to address this issue is to restart the failed D2D broadcast transmission procedure with msg1. Of course, in this procedure, previously received parameters and corresponding values may be reused.” <i>Kim ’068</i> at [0165]. “Alternatively, if there is no response to msg4, msg1 may be skipped and a msg3 scheduling grant may be received again by monitoring msg2 in agreed subframe(s) (subframe(s) agreed to be recognized in this situation) in which msg2 is transmitted.” <i>Kim ’068</i> at [0167]. “Upon receiving msg1, the cluster head determines or schedules a time for the Tx UE to broadcast msg3, and then delivers the time information to the Tx UE using msg2. This information may be recognized through broadcast slot configuration information that is broadcast. Meanwhile, RX UEs which desire to or must overhear msg3 should be allowed to overhear msg2. The time at which msg2 is transmitted needs to be pre-announced such that all UEs within the D2D broadcast the range can overhear msg2 or all RX UEs within the broadcast ranging can receive msg2. That is, if the UEs know that msg1 has been transmitted by the TX UE, the UEs may be allowed to recognize the msg2 transmission time. For example, msg2 transmission may be designed to be performed in the N msg1-th subframe after msg1 is transmitted. Alternatively, a msg2 transmission time candidate may be determined, and the RX UE may be caused to monitor msg2 at the determined time (e.g., subframes) and to decode a specific PDCCH upon detecting the PDCCH. For example, subframe #0 of every radio frame, every even-numbered radio frame or every odd-numbered radio frame may be pre-signaled through D2D configuration information as a msg2 transmission time candidate. The msg2 transmission time (e.g., Subframe(s) having a specific subframe or subframe set or periodicity) may be pre-fixed or

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	pre-set to a specific value. Alternatively, the msg2 transmission time may be changed through the OAM procedure. Alternatively, if the UE(s) are within the eNB coverage, the transmission time may be modified in a manner that configuration information is downloaded onto and stored in the UES or determined by exchanging a negotiation signal with the cluster head or between UEs in a group in a distribution manner. Alternatively, the transmission time may be determined when the synchronization signal of the cluster head is received. In this case, D2D configuration information may be obtained in association with the properties (e.g., type, index, etc.) of the synchronization signal or through message information delivered together with or after the synchronization signal. The synchronization signal used for D2D communication may be a synchronization signal or a synchronization channel that is defined separately from the legacy PSS/SSS. The D2D UEs may receive a synchronization signal/channel from the cluster head or another UE and establish synchronization with other UES participating in D2D communication.” <i>Kim ’068</i> at [0189]. “Msg2 contains scheduling information which is necessary for msg3 broadcast. Examples of the scheduling information include a temporary ID, power control information, timing information, and cyclic prefix (CP) information. The Tx UE and Rx UEs which receive msg2 may recognize the time or resource (e.g., a transmission sub-frame) to transmit msg3 and the time or resource (a monitoring subframe or reception subframe) to overhear msg3.” <i>Kim ’068</i> at [0190]. “One msg2 may be used to schedule multiple sub-sequent msg3 messages. It is proposed that msg2 be implemented in a manner that multiple msg3 scheduling grants are transmitted all at once as in the case of random access response (RAR) message configuration. According to this method, a scheduling command is not transmitted every time scheduling for msg3 transmission to be applied later is needed. Rather, Scheduling commands for multiple msg3 messages are received simultaneously by transmitting msg2 only once.” <i>Kim ’068</i> at [0191]. “The embodiments of the present invention are applicable to an eNB, a UE, or other devices in a wireless communication system. What is claimed is: 1. A method for transmitting a device-to-device (D2D) signal by a user equipment (UE) positioned outside a network, the method comprising: transmitting a first message to a cluster head of a cluster containing a plurality of UEs using a preconfigured resource; receiving, from the cluster head, a second message containing control

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“<i>Kim</i> ’068”)
	information for transmission of the D2D signal; and transmitting the D2D signal based on the control information.” <i>Kim</i> ’068 at [0246], [claim 1].
[1c] after monitoring, by at least one of the first UE or the second UE, the RAR corresponding to the preamble and sent by the eNB: sending, by at least one of the first UE or the second UE, a message 3 according to a Uplink (UL) grant allocated thereto, wherein the message 3 comprises a number of UEs having random access requests in the UE group or a number of UEs contained in the UE group or a pre-set UE number.	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim</i> ’068 discloses after monitoring, by at least one of the first UE or the second UE, the RAR corresponding to the preamble and sent by the eNB: sending, by at least one of the first UE or the second UE, a message 3 according to a Uplink (UL) grant allocated thereto, wherein the message 3 comprises a number of UEs having random access requests in the UE group or a number of UEs contained in the UE group or a pre-set UE number. See ’430 elements [1pre], [1a], [1b]. In addition, <i>Kim</i> ’068 discloses, e.g.: “FIG. 13 illustrates exemplary utilization of msg4 for receiving multiple msg3 messages.” <i>Kim</i> ’068 at [0041].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	FIG. 13 “When the UE accesses an eNB for the first time or there is no radio resource for signal transmission, the UE may perform a random access procedure for the eNB (S303 to S306). To this end, the UE may transmit a specific sequence as a preamble through a physical random access channel (PRACH) (S303

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	and S305) and receive a response message to the preamble through the PDCCH and the PDSCH corresponding to the PDCCH (S304 and S306). In a contention-based random access procedure, a contention resolution procedure may be additionally performed.” <i>Kim ’068</i> at [0061]. “Control information that the UE transmits to the eNB or receives from the eNB through uplink includes a UL/DL acknowledgement (ACK)/negative ACK (NACK) signal and channel state information (CSI) Such as a channel quality indicator (CQI), a precoding matrix (PMI) and a rank indicator (RI). For the 3GPP LTE system, the UE may transmit the ACK/NACK signal and only control information (UCI) such as the CSI over a PUSCH and/or PUCCH.” <i>Kim ’068</i> at [0063]. “A random access procedure that a UE performs with a specific eNB may include (1) the UE transmitting a random access preamble to the eNB (hereafter, referred to as transmission of ‘a first message (message 1)’ if there is no confusion), (2) receiving a random access response from the eNB in response to the transmitted random access preamble (hereafter, referred to as reception of ‘a second message (message 2)’ if there is no confusion), (3) transmitting a UL message using the information received through the random access response message (hereafter, referred to as transmission of ‘a third message (message 3)’ if there is no confusion) and (4) receiving a message corresponding to the UL message from the eNB (hereafter, referred to as reception of ‘a fourth message (message 4)’ if there is no confusion).” <i>Kim ’068</i> at [0072]. “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080]. “(3) Transmission of Message 3” <i>Kim ’068</i> at [0088]. “If the UE receives a valid random access response, the UE processes the information included in the random access response. That is, the UE applies the TAC and stores the temporary C-RNTI. In addition, the UE transmits data (i.e., message 3) to the eNB using the UL grant (S403). Message 3 should include an ID of the UE. This is because the eNB cannot determine which UEs perform the random access procedure in the contention-based random access procedure and the UEs need to be identified for future contention resolution.” <i>Kim ’068</i> at [0089]. “Two methods to include the ID of the UE in message 3 have been discussed. According to a first method, if the UE has a valid cell ID assigned thereto in a corresponding cell before the random access procedure, the UE transmits the cell ID thereof via a UL transmission signal corresponding to the UL grant. On the other hand, if the UE has not been assigned a valid cell ID before the random access procedure, the UE transmits its unique ID (e.g., System Architecture Evolution (SAE)-Temporary Mobile Subscriber Identity (S-TMSI) or a random ID) in the message. In general, the unique ID is longer than the cell ID. Once the UE has transmitted data corresponding to the UL grant, the UE starts a contention resolution timer.” <i>Kim ’068</i> at [0090]. “Resources for D2D communication may be assigned by an eNB. To this end, a transmission (Tx) UE performing D2D communication may make a request to the eNB for a radio resource, and the eNB may assign a resource in response. Thereby, the Tx UE may transmit signals to one or more reception (RX) UES through the assigned resource. In the following description, a method for a Tx UE to

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	randomly access an eNB in a manner different from the aforementioned typical D2D communication or in a manner similar to the random access procedure to initiate D2D communication is proposed.” <i>Kim ’068</i> at [0093]. “In one embodiment of the present invention, it is proposed that direct communication between UEs be implemented in a manner of broadcast, groupcast or group communication service by changing messages 1 to 4 of the legacy random access procedure as described below. Hereinafter, for simplicity of description, message 1, message 2, message 3 and message 4 are expressed as msg1, msg2, msg3 and msg4, respectively.” <i>Kim ’068</i> at [0094]. “Step 2 is a response of the eNB to Step 1. Step 2 delivers information (e.g., resource assignment, power control, timing lapse, cyclic prefix (CP) length, and the like) which is needed for the D2D UE having requested Step 1 to transmit a broadcast/groupcast signal corresponding to msg3. Herein, the signal may be referred to as msg2” <i>Kim ’068</i> at [0099]. “Msg3 (Step 3):” <i>Kim ’068</i> at [0100]. “Step 3 is a procedure in which the D2D broadcast/ groupcast Tx UE having requested Step 1 delivers a broadcast/groupcast signal to a D2D RX UE. In some cases, the signal may be delivered only to a restricted D2D RX UE or UE group. That is, the subject to receive the broadcast/ groupcast signal may be limited. Further, in some cases, an eNB may be allowed to receive the signal and perform a proper operation (e.g., relay or repetitive transmission) in response. Herein, the signal may be referred to as msg3.” <i>Kim ’068</i> at [0101]. “Step 4 represents an operation of assisting normal implementation of Step 3. Step 3 causes an operation to be performed according to whether signal reception is successful or according to a channel over which a signal is incorrectly received and a cause of incorrect signal reception. In some cases, the eNB may broadcast/groupcast, to D2D RX UEs or an RX UE group, a message (msg3) transmitted in Step 3, at a transmission time of Step 4. Herein, the aforementioned signal may be referred to as msg4.” <i>Kim ’068</i> at [0103].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	“In FIGS. 6 and 7, the eNB may transmit msg2 containing information about, for example, resource assign-ment for transmission of msg3 of the Tx UE to the Tx UE in response to msg1.” <i>Kim ’068</i> at [0108]. “In the example illustrated in FIG. 6, the Tx UE receives msg2 and transmits msg3 to RX UES of a prede-termined group. That is, in the example of FIG. 6, the Tx UE may directly deliver msg3 to RX UEs using resources assigned through msg2, without intervention of the eNB. When necessary, the RX UEs receiving msg3 may deliver msg4 to the Tx UE to signal whether or not reception of msg3 is successful.” <i>Kim ’068</i> at [0109]. “Contrary to FIG. 6, FIG. 7 illustrates an exemplary case where a serving eNB in place of the TX UE transmits msg3 to a predetermined RX UE group. When necessary, the RX UEs receiving msg3 may deliver msg4 to the eNB to signal whether or not reception of msg3 is successful.” <i>Kim ’068</i> at [0110]. “Similar to FIG. 6, FIG. 8 illustrates an example of direct transmission of a broadcast/groupcast signal from a Tx UE. In the example of FIG. 8, the serving eNB also receives msg3 transmitted by the TX UE, and transmits msg.4 as necessary. As the eNB receives msg3, not only the Tx UE but also the eNB may become subjects to perform retrains-mission according to a HARQ retransmission request, as will be described later.” <i>Kim ’068</i> at [0112]. “According to embodiments of the present invention, it is proposed that a Tx UE randomly select a signature from among predetermined signatures received through system information as in the case of the random access preamble of LTE and transmit msg1 through a resource randomly selected from among predetermined time-frequency resources.” <i>Kim ’068</i> at [0115]. “As described in the aforementioned operation, msg3 and msg4 may substantially correspond to a message that the Tx UE intends to deliver through broadcast and a corresponding acknowledgment, respectively.” <i>Kim ’068</i> at [0156]. “In the case of LTE RACH, a UE having performed initial transmission of msg1 is designed to monitor msg2 and transmit corresponding msg3. According to the method of this embodiment, msg3 is

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	intended to be broadcast to RX UEs, and therefore the RX UEs will not receive msg1, nor will the RX UEs attempt to monitor msg2. Furthermore, the RX UEs may not know the fact that the Tx UE has sent msg3, nor attempt to monitor and receive msg3. In particular, the RX UEs should receive msg3, which is usually transmitted by a UE.” <i>Kim</i> ’068 at [0157]. “Accordingly, in order to receive msg3, a special action is to be taken in advance. In particular, information for decoding and demodulating msg3 is necessary. For this reason, it is preferable for the Rx UEs to receive msg2, which serves to approve scheduling of msg3. That is, it is preferable to deliver, to the RX UEs, information capable of executing decoding and demodulation of msg3 (resource allocation, MCS, HARQ, transmission time, timing lapse, CP length, emergency indicator, hopping indicator, priority indicator, number of msg3 transmissions, retransmission timing, a HARQ response method, etc.) through msg2. In addition, before the msg2 and information for decoding and demodulation are delivered, the RX UEs need to receive msg2. Accordingly, it is preferable to pre-signal information about a time at which msg2 is transmitted or is likely to be transmitted, RNTI-related information (e.g., RA-RNTI for demasking PDCCH for msg2 if the PDCCH is masked with an RNTI, a range of RNTI values reserved for a D2D Tx UE or a certain allocated value), a Tx UE ID (when necessary), and information about msg1 of the TX UE (e.g., a time frequency resource index, a subframe, a radio frame, a UE ID, an IMSI), particularly, information used in scrambling and masking msg2.” <i>Kim</i> ’068 at [0158]. “Alternatively, information (a fixed or determined value) about a subframe in which MSG2 is transmitted may be pre-signaled to the RX UES in a broadcast manner, and a subframe or a radio frame configured in this way may need to be persistently monitored to decode and demodulate msg3.” <i>Kim</i> ’068 at [0159]. “When msg3 is delivered via a relay, the delivered msg3 is likely to take the form of msg4. Accordingly, the RX UE persistently performs monitoring at the msg4 delivery time to decode and demodulate msg4 (having a format including msg3 information or including a case where msg3 itself is transmitted) so as to finally obtain a broadcast message.” <i>Kim</i> ’068 at [0160].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	“Alternatively, if msg4 is transmitted in the same format as msg3, this transmission may be considered as retransmission or repetitive transmission of msg3 rather than transmission of msg4.” <i>Kim</i> ’068 at [0161]. “Next, if msg2 is received, it is assumed that msg3 has been normally transmitted. Msg3 may be delivered from a TX UE to an eNB and RX UES. Once the eNB receives msg3, the eNB may deliver msg4 to the Tx UE to signal whether or not reception is successful. Similarly, in the case of groupcast, RX UEs receiving msg3 may transmit msg.4 (wherein msg4 is a message delivered to the Tx UE by the RX UEs and may be identical to or different from a message which is delivered to the Tx UE by the eNB) to signal whether or not reception is successful. In the case of broadcast, the RX UEs may not perform msg4 transmission. Alternatively, the RX UEs may deliver, to the eNB, information indicating whether or not reception of msg4 is successful, and the eNB may collect the information and deliver the same to the Tx UE. In this method, it is assumed that the eNB is capable of receiving signals from all RX UEs relatively well. In this case, the eNB may become a device to finally determine whether or not msg3 is received. If msg3 is not properly delivered, the eNB may re-schedule msg2 such that msg3 transmission is attempted.” <i>Kim</i> ’068 at [0162]. “When two or more Tx UEs transmit msg3, msg3 transmitted by one of the Tx UEs may be detected and successfully demodulated by the eNB. In this case, msg4 response may be delivered to the Tx UE having successfully transmitted msg3. Then, the eNB having successfully received msg3 may respond to the Tx UE using msg4 for announcing whether or not reception of the broadcast message is successful. Then, the Tx UE terminates the broadcast transmission procedure. However, a Tx UE receiving msg4 response which is not directed thereto, the Tx UE preferably returns to the msg1 transmission operation. Since even the eNB does not know which Tx UE has transmitted a broadcast, a msg2 scheduling grant for msg3 cannot be generated. This contention resolution procedure is performed using RACH msg4. In this case, if a Tx UE receiving msg4 determines that msg4 does not have the UE ID of the Tx UE, transmission of msg1 is performed.” <i>Kim</i> ’068 at [0171]. “Upon receiving msg1, the cluster head determines or schedules a time for the Tx UE to broadcast msg3, and then delivers the time information to the Tx UE using msg2. This information may be

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	recognized through broadcast slot configuration information that is broadcast. Meanwhile, RX UEs which desire to or must overhear msg3 should be allowed to overhear msg2. The time at which msg2 is transmitted needs to be pre-announced such that all UEs within the D2D broadcast the range can overhear msg2 or all RX UEs within the broadcast ranging can receive msg2. That is, if the UEs know that msg1 has been transmitted by the TX UE, the UEs may be allowed to recognize the msg2 transmission time. For example, msg2 transmission may be designed to be performed in the N msg1-th subframe after msg1 is transmitted. Alternatively, a msg2 transmission time candidate may be determined, and the RX UE may be caused to monitor msg2 at the determined time (e.g., Subframes) and to decode a specific PDCCH upon detecting the PDCCH. For example, subframe #0 of every radio frame, every even-numbered radio frame or every odd-numbered radio frame may be pre-signaled through D2D configuration information as a msg2 transmission time candidate. The msg2 transmission time (e.g., subframe(s) having a specific subframe or subframe set or periodicity) may be pre-fixed or pre-set to a specific value. Alternatively, the msg2 transmission time may be changed through the OAM procedure. Alternatively, if the UE(s) are within the eNB coverage, the transmission time may be modified in a manner that configuration information is downloaded onto and stored in the UES or determined by exchanging a negotiation signal with the cluster head or between UEs in a group in a distribution manner. Alternatively, the transmission time may be determined when the synchronization signal of the cluster head is received. In this case, D2D configuration information may be obtained in association with the properties (e.g., type, index, etc.) of the synchronization signal or through message information delivered together with or after the synchronization signal. The synchronization signal used for D2D communication may be a synchronization signal or a synchronization channel that is defined separately from the legacy PSS/SSS. The D2D UEs may receive a synchronization signal/channel from the cluster head or another UE and establish synchronization with other UES participating in D2D communication.” <i>Kim ’068</i> at [0189]. “Msg2 contains scheduling information which is necessary for msg3 broadcast. Examples of the scheduling information include a temporary ID, power control information, timing information, and cyclic prefix (CP) information. The Tx UE and Rx UEs which receive msg2 may recognize the time or resource (e.g., a transmission sub-frame) to transmit msg3 and the time or resource (a monitoring subframe or reception subframe) to overhear msg3.” <i>Kim ’068</i> at [0190].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	“One msg2 may be used to schedule multiple sub-sequent msg3 messages. It is proposed that msg2 be implemented in a manner that multiple msg3 scheduling grants are transmitted all at once as in the case of random access response (RAR) message configuration. According to this method, a scheduling command is not transmitted every time scheduling for msg3 transmission to be applied later is needed. Rather, Scheduling commands for multiple msg3 messages are received simultaneously by transmitting msg2 only once.” <i>Kim ’068</i> at [0191]. “The Tx UE transmits msg3 using a designated parameter (time, frequency, power, etc.). Msg3 may be generated using a pre-designated D2D (broadcast) tempo-rary ID. For example, msg3 may be scrambled using the temporary C-R NTI of the LTE system and/or the interna-tional mobile subscriber identity (IMIS). Msg3 may contain a UEID in order to resolve collision with another broadcast Tx UE. The UE ID may be separately created for D2D communication.” <i>Kim ’068</i> at [0192]. “Msg4 may also be needed for communication outside the network. Msg4 may be used outside the network at least in order to determine whether or not the aforementioned collision of msg3 occurs. For D2D communication outside the network, whether msg4 needs a function to check successful decoding of msg3 depends on the case. For example, the virtual ID described above or an equivalent ID may be used to transmit, through msg4, a signal indicating only whether msg3 has been correctly detected. If control information (e.g., information including a modulation and coding scheme (MCS) or a new data indicator (NDI)) is separately encoded in msg3, the Tx UE ID may also be included in msg3.” <i>Kim ’068</i> at [0224]. “For reference, since there are multiple receivers of msg3 outside the network, msg3 collision may have a different meaning from the convention cases. For example, when UE1, UE2, UE3, UE4 and UE5 are arranged in this order, if UE1 and UE5 transmit msg3 on the same resource simultaneously, each of UE2 and UE4 may successfully receive msg3 from either UE1 or UE5 that is close thereto, while UE3 may fail to receive msg3 from both UE1 and UE5.” <i>Kim ’068</i> at [0225]. “The embodiments of the present invention are applicable to an eNB, a UE, or other devices in a wireless communication system. What is claimed is: 1. A method for transmitting a device-to-device (D2D) signal by a user equipment (UE) positioned outside a network, the method comprising:

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	transmitting a first message to a cluster head of a cluster containing a plurality of UEs using a preconfigured resource; receiving, from the cluster head, a second message co-taining control information for transmission of the D2D signal; and transmitting the D2D signal based on the control infor-mation.” <i>Kim ’068</i> at [0246], [claim 1].
[2] The method according to claim 1, wherein the first UE is at least one of the following: at least one fixed UE; or, at least one UE determined according to a pre-set rule; or, at least one UE notified by the eNB.	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim ’068</i> discloses the first UE is at least one of the following: at least one fixed UE; or, at least one UE determined according to a pre-set rule; or, at least one UE notified by the eNB. See ’430 claim 1. In addition, <i>Kim ’068</i> discloses, e.g.: “The UE is fixed or mobile. The UE is a device that transmits and receives user data and/or various kinds of control information though communication with a base station (BS). The term ‘UE’ may be replaced with ‘terminal equipment’, ‘Mobile Station (MS)’, ‘Mobile Terminal (MT)’, ‘User Terminal (UT)’, ‘ Subscriber Station (SS)’, ‘wireless device’, ‘Personal Digital Assistant (PDA)’, ‘ wireless modem’, ‘handheld device’, etc. A BS is typically a fixed station that communicates with a UE and/or another BS. The BS exchanges data and control information with a UE and another BS. The term BS’ may be replaced with ‘Advanced Base Station (ABS)’, ‘Node B’, ‘evolved-Node B (eNB)’, ‘Base Transceiver System (BTS)’, ‘Access Point (AP)’, ‘Processing Server (PS)’, etc. In the following description, BS is commonly called eNB.” <i>Kim ’068</i> at [0006]. “One or more cells are managed by one eNB. A cell is configured to use one of bandwidths of 1.25, 2.5, 5, 10, 15, and 20 MHz to provide a downlink (DL) or uplink (UL) transmission service to multiple UEs. Different cells may be configured to provide different bandwidths. The eNB controls data transmission and reception to and from a plurality of UEs. For DL data, the eNB transmits DL scheduling information to notify a corresponding UE of time/frequency resources through which the data is to be transmitted, coding, data size, and hybrid automatic repeat and request (HARQ)-related information. For UL data, the eNB transmits UL scheduling information to a corresponding UE to inform the UE of available time/frequency resources, coding, data size, and HARQ-related

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	information. An interface for transmitting user traffic or control traffic between eNBs may be used. A core network (CN) may include an AG and a network node for user registration for the UE. The AG manages mobility of the UE on a tracking area (TA) basis, each TA including a plurality of cells.” <i>Kim ’068</i> at [0007]. “In the present invention, a node refers to a fixed point capable of transmitting/receiving a radio signal through communication with a UE. Various types of eNBs may be used as nodes irrespective of the terms thereof. For example, a BS, a node B (NB), an e-node B (eNB), a pico-cell eNB (PeNB), a home eNB (HeNB), a relay, a repeater, etc. may be a node. In addition, the node may not be an eNB. For example, the node may be a radio remote head (RRH) or a radio remote unit (RRU). The RRH or RRU generally has a lower power level than a power level of an eNB. Since the RRH or RRU (hereinafter, RRH/RRU) is generally connected to the eNB through a dedicated line such as an optical cable, cooperative communication between RRH/RRU and the eNB can be smoothly per-formed in comparison with cooperative communication between eNBs connected by a radio line. At least one antenna is installed per node. The antenna may mean a physical antenna or mean an antenna port, a virtual antenna, or an antenna group. A node may be referred to as a point. In the multi-node system, the same cell identity (ID) or different cell IDs may be used to transmit/receive signals to/from a plurality of nodes. If the plural nodes have the same cell ID, each of the nodes operates as a partial antenna group of one cell. If the nodes have different cell IDs in the multi-node system, the multi-node system may be regarded as a multi-cell (e.g. a macro-cell/femto-cell/pico-cell) system. If multiple cells formed respectively by multiple nodes are configured in an overlaid form according to coverage, a network formed by the multiple cells is referred to as a multi-tier network. A cell ID of an RRH/RRU may be the same as or different from a cell ID of an eNB. When the RRH/RRU and the eNB use different cell IDs, both the RRH/RRU and the eNB operate as independent eNBs.” <i>Kim ’068</i> at [0047]. “In selecting a random access preamble in the LTE system, both a contention-based random access procedure, through which the UE selects one preamble to use within a specific set, and a non-contention-based random access procedure, through which a random access preamble allocated to a specific UE by the eNB is used, are provided. The non-contention-based random access procedure may be used only in the HO procedure or only when the procedure is requested according to a command from the eNB.” <i>Kim ’068</i> at [0071].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	“Resources for D2D communication may be assigned by an eNB. To this end, a transmission (Tx) UE performing D2D communication may make a request to the eNB for a radio resource, and the eNB may assign a resource in response. Thereby, the Tx UE may transmit signals to one or more reception (RX) UES through the assigned resource. In the following description, a method for a Tx UE to randomly access an eNB in a manner different from the aforementioned typical D2D communication or in a manner similar to the random access procedure to initiate D2D communication is proposed.” <i>Kim ’068</i> at [0093]. “When P preamble sequences are given, some of the preamble sequences may be used for contention-based pre-amble transmission and the other preamble sequences may be used for non-contention-based preamble transmission. For contention-based transmission, a preamble (sequence index) resource for transmission is randomly selected from a predetermined preamble (sequence index) set. On the other end, for non-contention-based transmission, a preamble (sequence index) resource may be pre-designated/pre-assigned, or may need to be designed such that the resource is recognized explicitly or implicitly by a UE according to a transmission resource region (e.g. t id, f id), a UE ID, a UE group (ID), a UE priority index, and the like. For example, when msg1 is transmitted through a specific resource region, a preamble (sequence) index may be determined according to the position of the resource region. The UE may be allowed to select and apply either non-contention-based transmission or condition-based transmission without constraint. Alternatively, either non-contention-based transmission or condition-based transmission may be automatically preconfigured according to the UE application. For example, when the UE makes an emergency call, the UE may be preconfigured or fixed to attempt transmission using a contention-free source. Alternatively, a resource for transmission may be differently assigned depending on the cluster group in order to minimize collision.” <i>Kim ’068</i> at [0187].
[3] The method according to claim 1, wherein at least one of the preamble, the time domain resource or the frequency domain resource is pre-set, or determined by	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim ’068</i> discloses at least one of the preamble, the time domain resource or the frequency domain resource is pre-set, or determined by a group Identifier (ID) of the UE group, or notified by the eNB.

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
a group Identifier (ID) of the UE group, or notified by the eNB.	See ’430 claim 1. In addition, <i>Kim ’068</i> discloses, e.g.: “One or more cells are managed by one eNB. A cell is configured to use one of bandwidths of 1.25, 2.5, 5, 10, 15, and 20 MHz to provide a downlink (DL) or uplink (UL) transmission service to multiple UEs. Different cells may be configured to provide different bandwidths. The eNB controls data transmission and reception to and from a plurality of UEs. For DL data, the eNB transmits DL scheduling information to notify a corresponding UE of time/frequency resources through which the data is to be transmitted, coding, data size, and hybrid automatic repeat and request (HARQ)-related information. For UL data, the eNB transmits UL scheduling information to a corresponding UE to inform the UE of available time/frequency resources, coding, data size, and HARQ-related information. An interface for transmitting user traffic or control traffic between eNBs may be used. A core network (CN) may include an AG and a network node for user registration for the UE. The AG manages mobility of the UE on a tracking area (TA) basis, each TA including a plurality of cells.” <i>Kim ’068</i> at [0007]. “The object of the present invention can be achieved by providing a method for performing device-to-device (D2D) communication by a user equipment (UE) positioned outside a network. A UE having a D2D signal to transmit may make a request to a UE configured as a cluster head for a resource assignment for transmission of the D2D signal. Alternatively, the UE having a D2D signal to transmit may become the cluster head. The UE having a D2D signal to transmit may transmit the D2D signal according to the resource assignment performed by the cluster head or performed by the UE having become the cluster head. Other UEs receives the D2D signal by receiving or overhearing resource assignment information from the cluster head.” <i>Kim ’068</i> at [0014]. “In one aspect of the present invention, provided herein is a method for transmitting a D2D signal by a UE positioned outside a network, the method including trans-mitting a first message to a cluster head of a cluster con-taining a plurality of UEs using a preconfigured resource, receiving, from the cluster head, a second message contain-ing control information for transmission of the D2D signal, and transmitting the D2D signal based on the control infor-mation.” <i>Kim ’068</i> at [0015].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	“In another aspect of the present invention, provided herein is a user equipment (UE) for transmitting a device-to-device (D2D) signal, the UE being positioned outside a network and including a radio frequency (RF) unit and a processor configured to control the RF unit, wherein the processor is configured to control the RF unit to transmit a first message to a cluster head of a cluster containing a plurality of UEs using a preconfigured resource, to receive, from the cluster head, a second message containing control information for transmission of the D2D signal, and to broadcast the D2D signal based on the control information.” <i>Kim ’068</i> at [0016]. “In another aspect of the present invention, provided herein is a method for transmitting a device-to-device (D2D) signal by a user equipment (UE) positioned outside a network, the method including transmitting a cluster head decision signal containing an indicator indicating that the UE desires to become a cluster head of a cluster containing a plurality of UEs, transmitting a second message containing control information for transmission of the D2D signal, and transmitting the D2D signal based on the control information.” <i>Kim ’068</i> at [0017]. “In another aspect of the present invention, provided herein is a user equipment (UE) for transmitting a device-to-device (D2D) signal, the UE being positioned outside a network and including a radio frequency (RF) unit and a processor configured to control the RF unit, wherein the processor is configured to control the RF unit to transmit a cluster head decision signal containing an indicator indicating that the UE desires to become a cluster head of a cluster containing a plurality of UEs, to transmit a second message containing control information for transmission of the D2D signal, and to transmit the D2D signal based on the control information.” <i>Kim ’068</i> at [0018]. “According to embodiments of the present invention, direct communication between UEs may be performed in a wireless communication system while interference is efficiently attenuated.” <i>Kim ’068</i> at [0028]. “In the present invention, a node refers to a fixed point capable of transmitting/receiving a radio signal through communication with a UE. Various types of eNBs may be used as nodes irrespective of the terms thereof. For example, a BS, a node B (NB), an e-node B (eNB), a pico-cell eNB (PeNB), a home eNB (HeNB), a relay, a repeater, etc. may be a node. In addition, the node may not be an eNB. For

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	example, the node may be a radio remote head (RRH) or a radio remote unit (RRU). The RRH or RRU generally has a lower power level than a power level of an eNB. Since the RRH or RRU (hereinafter, RRH/RRU) is generally connected to the eNB through a dedicated line Such as an optical cable, cooperative communication between RRH/RRU and the eNB can be smoothly per formed in comparison with cooperative communication between eNBs connected by a radio line. At least one antenna is installed per node. The antenna may mean a physical antenna or mean an antenna port, a virtual antenna, or an antenna group. A node may be referred to as a point. In the multi-node system, the same cell identity (ID) or different cell IDs may be used to transmit/receive signals to/from a plurality of nodes. If the plural nodes have the same cell ID, each of the nodes operates as a partial antenna group of one cell. If the nodes have different cell IDs in the multi-node system, the multi-node system may be regarded as a multi-cell (e.g. a macro-cell/femto-cell/pico-cell) sys-tem. If multiple cells formed respectively by multiple nodes are configured in an overlaid form according to coverage, a network formed by the multiple cells is referred to as a multi-tier network. A cell ID of an RRH/RRU may be the same as or different from a cell ID of an eNB. When the RRH/RRU and the eNB use different cell IDs, both the RRH/RRU and the eNB operate as independent eNBs.” <i>Kim ’068</i> at [0047]. “In the present invention, a cell refers to a prescribed geographical area to which one or more nodes provide a communication service. Accordingly, in the present inven-tion, communicating with a specific cell may mean commu-nicating with an eNB or a node which provides a commu-nication service to the specific cell. In addition, a DL/UL signal of a specific cell refers to a DL/UL signal from/to an eNB or a node which provides a communication service to the specific cell. A node providing UL/DL communication services to a UE is called a serving node and a cell to which UL/DL communication services are provided by the serving node is especially called a serving cell. Furthermore, chan-nel status/quality of a specific cell refers to channel status/ quality of a channel or communication link formed between an eNB or node which provides a communication service to the specific cell and a UE. The UE may measure DL channel state received from a specific node using cell-specific ref-erence signal(s) (CRS(s)) transmitted on a CRS resource and/or channel state information reference signal(s) (CSI RS(s)) transmitted on a CSI-RS resource, allocated by antenna port(s) of the specific node to the specific node. Meanwhile, a 3GPP LTE/LTE-A system uses the concept of a cell in order to manage radio resources and a cell associ-ated with the radio resources is distinguished from a cell of a geographic region.” <i>Kim ’068</i> at [0048].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	“Recently, to use a wider frequency band in recent wireless communication systems, introduction of carrier aggregation (or BW aggregation) technology that uses a wider UL/DL BW by aggregating a plurality of UL/DL frequency blocks has been discussed. A carrier aggregation (CA) is different from an orthogonal frequency division multiplexing (OFDM) system in that DL or UL communication is performed using a plurality of carrier frequencies, whereas the OFDM system carries a base frequency band divided into a plurality of orthogonal Subcarriers on a single carrier frequency to perform DL or UL communication. Hereinbelow, each of carriers aggregated by carrier aggregation will be referred to as a component carrier (CC). The CCS may or may not be adjacent to each other in the frequency domain.” <i>Kim</i> ’068 at [0049]. “The ‘cell’ associated with the radio resources is defined by combination of downlink resources and uplink resources, that is, combination of DLCC and ULCC. The cell may be configured by downlink resources only, or may be configured by downlink resources and uplink resources. If carrier aggregation is Supported, linkage between a carrier frequency of the downlink resources (or DLCC) and a carrier frequency of the uplink resources (or ULCC) may be indicated by System information. In frequency division duplex (FDD), since the UL operation band is different from the DL operation band, different carrier frequencies are linked to constitute one cell, and SIB2 linkage designates, as a frequency of a UL CC, a frequency different from the frequency of a DL CC which the UE accesses. In other words, in the case of FDD, in a cell constituted by a DLCC and a ULCC linked to the DL CC, the DLCC and the UL CC operate at different frequencies. In time division duplex (TDD), the UL operation band is identical to the DL operation band. Accordingly, one carrier frequency constitutes one cell, and SIB2 linkage designates the frequency of a DL CC which the UE accesses as the frequency of a corresponding.” <i>Kim</i> ’068 at [0050]. “In this case, the carrier frequency means a center frequency of each cell or CC. A cell operating on a primary frequency may be referred to as a primary cell (Pcell) or PCC, and a cell operating on a secondary frequency may be referred to as a secondary cell (Scell) or SCC. The carrier corresponding to the Pcell on downlink will be referred to as a downlink primary CC (DL. PCC), and the carrier corresponding to the Pcell on uplink will be referred to as an uplink primary CC (ULPCC). A Scell means a cell that may be configured after completion of radio resource control (RRC)

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	connection establishment and used to provide additional radio resources. The Scell may form a set of serving cells for the UE together with the PCell in accordance with capabilities of the UE. The carrier corresponding to the Scell on the downlink will be referred to as downlink secondary CC (DLSCC), and the carrier corresponding to the Scell on the uplink will be referred to as uplink secondary CC (UL SCC). Although the UE is in RRC-CONNECTED state, if it is not configured by carrier aggregation or does not support carrier aggregation, a single serving cell configured by the Pcell only exists.” <i>Kim ’068</i> at [0051]. “A ‘cell’ of a geographic region may be understood as coverage within which a node can provide service using a carrier and a ‘cell’ of a radio resource is associated with bandwidth (BW) which is a frequency range configured by the carrier. Since DL coverage, which is a range within which the node is capable of transmitting a valid signal, and UL coverage, which is a range within which the node is capable of receiving the valid signal from the UE, depends upon a carrier carrying the signal, the coverage of the node may be associated with coverage of the ‘cell’ of a radio resource used by the node. Accordingly, the term ‘cell’ may be used to indicate service coverage of the node sometimes, a radio resource at other times, or a range that a signal using a radio resource can reach with valid strength at other times.” <i>Kim ’068</i> at [0052]. “3GPP LTE/LTE-A standards define DL physical channels corresponding to resource elements carrying information derived from a higher layer and DL physical signals corresponding to resource elements which are used by a physical layer but which do not carry information derived from a higher layer. For example, a physical downlink shared channel (PDSCH), a physical broadcast channel (PBCH), a physical multicast channel (PMCH), a physical control format indicator channel (PCFICH), a physical downlink control channel (PDCCH), and a physical hybrid ARQ indicator channel (PHICH) are defined as the DL physical channels, and a reference signal and a synchronization signal are defined as the DL physical signals. A reference signal (RS), also called a pilot, refers to a special waveform of a predefined signal known to both a BS and a UE. For example, a cell-specific RS (CRS), a UE-specific RS (UE-RS), a positioning RS (PRS), and channel state information RS (CSI-RS) may be defined as DL RSs. Meanwhile, the 3GPP LTE/LTE-A standards define UL physical channels corresponding to resource elements carrying information derived from a higher layer and UL physical signals corresponding to resource elements which are used by a physical layer but which do not carry

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	info-mation derived from a higher layer. For example, a physical uplink shared channel (PUSCH), a physical uplink control channel (PUCCH), and a physical random access channel (PRACH) are defined as the UL physical channels, and a demodulation reference signal (DMRS) for a UL control/ data signal and a Sounding reference signal (SRS) used for UL channel measurement are defined as the UL physical signals.” <i>Kim</i> ’068 at [0053]. “In the present invention, a physical downlink con-trol channel (PDCCH), a physical control format indicator channel (PCFICH), a physical hybrid automatic retransmit request indicator channel (PHICH), and a physical downlink shared channel (PDSCH) refer to a set of time-frequency resources or resource elements (REs) carrying downlink control information (DCI), a set of time-frequency resources or REs carrying a control format indicator (CFI), a set of time-frequency resources or REs carrying downlink acknowledgement (ACK)/negative ACK (NACK), and a set of time-frequency resources or RES carrying downlink data, respectively. In addition, a physical uplink control channel (PUCCH), a physical uplink shared channel (PUSCH) and a physical random access channel (PRACH) refer to a set of time-frequency resources or RES carrying uplink control information (UCI), a set of time-frequency resources or Res carrying uplink data and a set of time-frequency resources or REs carrying random access signals, respectively. In the present invention, in particular, a time-frequency resource or RE that is assigned to or belongs to PDCCH/PCFICH/ PHICH/PDSCH/PUCCH/PUSCH/PRACH is referred to as PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/ PRACH RE or PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/PRACH time-frequency resource, respectively. Therefore, in the present invention, PUCCH/PUSCH/ PRACH transmission of a UE is conceptually identical to UCI/uplink data/random access signal transmission on PUSCH/PUCCH/PRACH, respectively. In addition, PDCCH/PCFICH/PHICH/PDSCH transmission of an eNB is conceptually identical to downlink data/DCI transmission on PDCCH/PCFICH/PHICH/PDSCH, respectively.” <i>Kim</i> ’068 at [0054]. “When a UE is powered on or enters a new cell, the UE performs initial cell search such as establishment of synchronization with an eNB (S301). To this end, the UE may receive a primary synchronization signal (PSS) and a secondary synchronization signal (SSS) from the eNB, establish synchronization with the eNB, and acquire infor-mation such as a cell identity (ID). Thereafter, the UE

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	may receive a physical broadcast channel (PBCH) from the eNB to acquire information broadcast in the cell. Meanwhile, the UE may receive a downlink reference signal (DLRS) in the initial cell search step to confirm a DL channel State.” <i>Kim ’068</i> at [0059]. “Upon completion of initial cell search, the UE may receive a physical downlink control channel (PDCCH) and a physical downlink shared channel (PDSCH) according to information included in the PDCCH to acquire more detailed system information (S302).” <i>Kim ’068</i> at [0060]. “The random access procedure is requested by a command from the eNB.” <i>Kim ’068</i> at [0068]. “As described above, the non-contention-based random access procedure may be performed (1) in the HO procedure, and (2) when the procedure is requested by a command from the eNB. Of course, the condition-based random access procedure may also be performed in both cases.” <i>Kim ’068</i> at [0075]. “To ensure the non-contention-based random access procedure, it is important to receive a designated random access preamble which has no possibility of collision from the eNB. The random access preamble may be indicated to the UE through an HO command or a PDCCH command. Thereby, the random access preamble is assigned to the UE (S401).” <i>Kim ’068</i> at [0076]. “After the UE is assigned a random access preamble solely designated thereto, the UE transmits the designated random access preamble to the eNB (S402).” <i>Kim ’068</i> at [0078]. “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080]. “The random access preamble ID is needed for a random access response since one random access response contains random access response information for one or more UEs. That is, it is necessary to announce a UE for which the UL grant, the temporary C-RNTI and the TAC are valid. In this step, it is assumed that the UE selects a random access preamble ID coinciding with a random access pre-amble the UE has selected in step S402.” <i>Kim ’068</i> at [0081]. “Resources for D2D communication may be assigned by an eNB. To this end, a transmission (Tx) UE performing D2D communication may make a request to the eNB for a radio resource, and the eNB may assign a resource in response. Thereby, the Tx UE may transmit signals to one or more reception (RX) UES through the assigned resource. In the following description, a method for a Tx UE to randomly access an eNB in a manner different from the aforementioned typical D2D communication or in a manner similar to the random access procedure to initiate D2D communication is proposed.” <i>Kim ’068</i> at [0093]. “According to embodiments of the present invention, it is proposed that a Tx UE randomly select a signature from among predetermined signatures received through system information as in the case of the random access preamble of LTE and transmit msg1 through a resource randomly selected from among predetermined time-frequency resources.” <i>Kim ’068</i> at [0115]. “Alternatively, information (a fixed or determined value) about a subframe in which MSG2 is transmitted may be pre-signaled to the Rx UEs in a broadcast manner, and a subframe or a radio frame

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	configured in this way may need to be persistently monitored to decode and demodulate msg3.” <i>Kim ’068</i> at [0159]. “When P preamble sequences are given, some of the preamble sequences may be used for contention-based pre-amble transmission and the other preamble sequences may be used for non-contention-based preamble transmission. For contention-based transmission, a preamble (sequence index) resource for transmission is randomly selected from a predetermined preamble (sequence index) set. On the other end, for non-contention-based transmission, a preamble (sequence index) resource may be pre-designated/pre-assigned, or may need to be designed such that the resource is recognized explicitly or implicitly by a UE according to a transmission resource region (e.g. t id, f id), a UE ID, a UE group (ID), a UE priority index, and the like. For example, when msg1 is transmitted through a specific resource region, a preamble (sequence) index may be determined according to the position of the resource region. The UE may be allowed to select and apply either non-contention-based transmission or condition-based transmission without constraint. Alternatively, either non-contention-based transmission or condition-based transmission may be automatically preconfigured according to the UE application. For example, when the UE makes an emergency call, the UE may be preconfigured or fixed to attempt transmission using a contention-free source. Alternatively, a resource for transmission may be differently assigned depending on the cluster group in order to minimize collision.” <i>Kim ’068</i> at [0187]. “Transmission of msg1 may be performed using a pre-designated time and resource (as in the case of LTE RACH access slot pre-configuration, namely PRACH reconfiguration), or may be performed using a time and resource determined based on a unique attribute (e.g., ID) of the UE. Alternatively, transmission may be performed based on information broadcast by the cluster head with a periodicity. For example, if an RX UE detects a specific cluster head and desires to operate in a group to which the cluster head belongs, the UE identifies a resource for a Tx UE to use to perform broadcast by monitoring the broadcast information of the cluster head. The cluster head may transmit D2D access configuration information for msg1 through a beacon, a synchronization channel, or a broadcast channel. This operation may be similar to a preliminary procedure through which the PRACH configuration should be received before transmission of the PRACH preamble. Meanwhile, configuration information containing timing information about msg1, msg2, msg3 and msg4 may be pre-

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	provided to all D2D UEs. This method may be implemented through operation and management (OAM) or a broadcast signal.” <i>Kim ’068</i> at [0188]. “Upon receiving msg1, the cluster head determines or schedules a time for the Tx UE to broadcast msg3, and then delivers the time information to the Tx UE using msg2. This information may be recognized through broadcast slot configuration information that is broadcast. Meanwhile, RX UEs which desire to or must overhear msg3 should be allowed to overhear msg2. The time at which msg2 is transmitted needs to be pre-announced such that all UEs within the D2D broadcast the range can overhear msg2 or all RX UEs within the broadcast ranging can receive msg2. That is, if the UEs know that msg1 has been transmitted by the TX UE, the UEs may be allowed to recognize the msg2 transmission time. For example, msg2 transmission may be designed to be performed in the N msg1-th subframe after msg1 is transmitted. Alternatively, a msg2 transmission time candidate may be determined, and the RX UE may be caused to monitor msg2 at the determined time (e.g., subframes) and to decode a specific PDCCH upon detecting the PDCCH. For example, subframe #0 of every radio frame, every even-numbered radio frame or every odd-numbered radio frame may be pre-signaled through D2D configuration information as a msg2 transmission time candidate. The msg2 transmission time (e.g., subframe(s) having a specific subframe or subframe set or periodicity) may be pre-fixed or pre-set to a specific value. Alternatively, the msg2 transmission time may be changed through the OAM procedure. Alternatively, if the UE(s) are within the eNB coverage, the transmission time may be modified in a manner that configuration information is downloaded onto and stored in the UES or determined by exchanging a negotiation signal with the cluster head or between UEs in a group in a distribution manner. Alternatively, the transmission time may be determined when the synchronization signal of the cluster head is received. In this case, D2D configuration information may be obtained in association with the properties (e.g., type, index, etc.) of the synchronization signal or through message information delivered together with or after the synchronization signal. The synchronization signal used for D2D communication may be a synchronization signal or a synchronization channel that is defined separately from the legacy PSS/SSS. The D2D UEs may receive a synchronization signal/channel from the cluster head or another UE and establish synchronization with other UES participating in D2D communication.” <i>Kim ’068</i> at [0189].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
[4] The method according to claim 3, wherein at least one of the preamble, the time domain resource or the frequency domain resource corresponds to the number of UEs having random access requests in the UE group or the number of UEs contained in the UE group or the pre-set UE number.	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim ’068</i> discloses at least one of the preamble, the time domain resource or the frequency domain resource corresponds to the number of UEs having random access requests in the UE group or the number of UEs contained in the UE group or the pre-set UE number. See ’430 claims 1, 3. In addition, <i>Kim ’068</i> discloses, e.g.: “The object of the present invention can be achieved by providing a method for performing device-to-device (D2D) communication by a user equipment (UE) positioned outside a network. A UE having a D2D signal to transmit may make a request to a UE configured as a cluster head for a resource assignment for transmission of the D2D signal. Alternatively, the UE having a D2D signal to transmit may become the cluster head. The UE having a D2D signal to transmit may transmit the D2D signal according to the resource assignment performed by the cluster head or per-formed by the UE having become the cluster head. Other UEs receives the D2D signal by receiving or overhearing resource assignment information from the cluster head.” <i>Kim ’068</i> at [0014]. “In one aspect of the present invention, provided herein is a method for transmitting a D2D signal by a UE positioned outside a network, the method including trans-mitting a first message to a cluster head of a cluster con-taining a plurality of UEs using a preconfigured resource, receiving, from the cluster head, a second message contain-ing control information for transmission of the D2D signal, and transmitting the D2D signal based on the control infor-mation.” <i>Kim ’068</i> at [0015]. “In another aspect of the present invention, provided herein is a user equipment (UE) for transmitting a device-to-device (D2D) signal, the UE being positioned outside a network and including a radio frequency (RF) unit and a processor configured to control the RF unit, wherein the processor is configured to control the RF unit to transmit a first message to a cluster head of a cluster containing a plurality of UEs using a preconfigured resource, to receive, from the cluster head, a second message containing control information for transmission of the D2D signal, and to

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	broadcast the D2D signal based on the control information.” <i>Kim ’068</i> at [0016]. “In another aspect of the present invention, provided herein is a method for transmitting a device-to-device (D2D) signal by a user equipment (UE) positioned outside a network, the method including transmitting a cluster head decision signal containing an indicator indicating that the UE desires to become a cluster head of a cluster containing a plurality of UEs, transmitting a second message containing control information for transmission of the D2D signal, and transmitting the D2D signal based on the control information.” <i>Kim ’068</i> at [0017]. “In another aspect of the present invention, provided herein is a user equipment (UE) for transmitting a device-to-device (D2D) signal, the UE being positioned outside a network and including a radio frequency (RF) unit and a processor configured to control the RF unit, wherein the processor is configured to control the RF unit to transmit a cluster head decision signal containing an indicator indicating that the UE desires to become a cluster head of a cluster containing a plurality of UEs, to transmit a second message containing control information for transmission of the D2D signal, and to transmit the D2D signal based on the control information.” <i>Kim ’068</i> at [0018]. “According to embodiments of the present invention, direct communication between UEs may be performed in a wireless communication system while interference is efficiently attenuated.” <i>Kim ’068</i> at [0028]. “In the present invention, a node refers to a fixed point capable of transmitting/receiving a radio signal through communication with a UE. Various types of eNBs may be used as nodes irrespective of the terms thereof. For example, a BS, a node B (NB), an e-node B (eNB), a pico-cell eNB (PeNB), a home eNB (HeNB), a relay, a repeater, etc. may be a node. In addition, the node may not be an eNB. For example, the node may be a radio remote head (RRH) or a radio remote unit (RRU). The RRH or RRU generally has a lower power level than a power level of an eNB. Since the RRH or RRU (hereinafter, RRH/RRU) is generally connected to the eNB through a dedicated line Such as an optical cable, cooperative communication between RRH/RRU and the eNB can be smoothly performed in comparison with cooperative communication between eNBs connected by a radio line. At least one antenna is installed per node. The antenna may mean a physical antenna or mean an antenna port, a

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	virtual antenna, or an antenna group. A node may be referred to as a point. In the multi-node system, the same cell identity (ID) or different cell IDs may be used to transmit/receive signals to/from a plurality of nodes. If the plural nodes have the same cell ID, each of the nodes operates as a partial antenna group of one cell. If the nodes have different cell IDs in the multi-node system, the multi-node system may be regarded as a multi-cell (e.g. a macro-cell/femto-cell/pico-cell) system. If multiple cells formed respectively by multiple nodes are configured in an overlaid form according to coverage, a network formed by the multiple cells is referred to as a multi-tier network. A cell ID of an RRH/RRU may be the same as or different from a cell ID of an eNB. When the RRH/RRU and the eNB use different cell IDs, both the RRH/RRU and the eNB operate as independent eNBs.” <i>Kim ’068</i> at [0047]. “In the present invention, a cell refers to a prescribed geographical area to which one or more nodes provide a communication service. Accordingly, in the present invention, communicating with a specific cell may mean communicating with an eNB or a node which provides a communication service to the specific cell. In addition, a DL/UL signal of a specific cell refers to a DL/UL signal from/to an eNB or a node which provides a communication service to the specific cell. A node providing UL/DL communication services to a UE is called a serving node and a cell to which UL/DL communication services are provided by the serving node is especially called a serving cell. Furthermore, channel status/quality of a specific cell refers to channel status/ quality of a channel or communication link formed between an eNB or node which provides a communication service to the specific cell and a UE. The UE may measure DL channel state received from a specific node using cell-specific reference signal(s) (CRS(s)) transmitted on a CRS resource and/or channel state information reference signal(s) (CSI RS(s)) transmitted on a CSI-RS resource, allocated by antenna port(s) of the specific node to the specific node. Meanwhile, a 3GPP LTE/LTE-A system uses the concept of a cell in order to manage radio resources and a cell associated with the radio resources is distinguished from a cell of a geographic region.” <i>Kim ’068</i> at [0048]. “Recently, to use a wider frequency band in recent wireless communication systems, introduction of carrier aggregation (or BW aggregation) technology that uses a wider UL/DL BW by aggregating a plurality of UL/DL frequency blocks has been discussed. A carrier aggregation (CA) is different from an orthogonal frequency division multiplexing (OFDM) system in that DL or UL communication is performed using a plurality of carrier frequencies, whereas the OFDM system carries a base frequency

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	band divided into a plurality of orthogonal Subcarriers on a single carrier frequency to perform DL or UL communication. Hereinbelow, each of carriers aggregated by carrier aggregation will be referred to as a component carrier (CC). The CCS may or may not be adjacent to each other in the frequency domain.” <i>Kim ’068</i> at [0049]. “When P preamble sequences are given, some of the preamble sequences may be used for contention-based pre-amble transmission and the other preamble sequences may be used for non-contention-based preamble transmission. For contention-based transmission, a preamble (sequence index) resource for transmission is randomly selected from a predetermined preamble (sequence index) set. On the other end, for non-contention-based transmission, a preamble (sequence index) resource may be pre-designated/pre-assigned, or may need to be designed such that the resource is recognized explicitly or implicitly by a UE according to a transmission resource region (e.g. t id, f id), a UE ID, a UE group (ID), a UE priority index, and the like. For example, when msg1 is transmitted through a specific resource region, a preamble (sequence) index may be determined according to the position of the resource region. The UE may be allowed to select and apply either non-contention-based transmission or condition-based transmission without constraint. Alternatively, either non-contention-based transmission or condition-based transmission may be automatically preconfigured according to the UE application. For example, when the UE makes an emergency call, the UE may be preconfigured or fixed to attempt transmission using a contention-free source. Alternatively, a resource for transmission may be differently assigned depending on the cluster group in order to minimize collision.” <i>Kim ’068</i> at [0187]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim ’068</i>, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
[5pre] The method according to claim 1, wherein monitoring, by at least one of the first UE or the second UE, the RAR corresponding to the preamble and sent by the eNB comprises: descrambling, by at least one of the first UE or the second UE, a Cyclic Redundancy Check (CRC) of Downlink Control Information (DCI) for scheduling the RAR according to a pre-set Random Access Radio Network Temporary Identity (RA-RNTI) or an RA-RNTI corresponding to the preamble, and receiving the RAR, the RAR comprising at least one of at least one Temporary Cell Radio Network Temporary Identity (TC-RNTI) or at least one Uplink (UL) grant; and	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim ’068</i> discloses wherein monitoring, by at least one of the first UE or the second UE, the RAR corresponding to the preamble and sent by the eNB comprises: descrambling, by at least one of the first UE or the second UE, a Cyclic Redundancy Check (CRC) of Downlink Control Information (DCI) for scheduling the RAR according to a pre-set Random Access Radio Network Temporary Identity (RA-RNTI) or an RA-RNTI corresponding to the preamble, and receiving the RAR, the RAR comprising at least one of at least one Temporary Cell Radio Network Temporary Identity (TC-RNTI) or at least one Uplink (UL) grant. See ’430 claim elements 1pre, 1b. In addition, <i>Kim ’068</i> discloses, e.g.: “One or more cells are managed by one eNB. A cell is configured to use one of bandwidths of 1.25, 2.5, 5, 10, 15, and 20 MHz to provide a downlink (DL) or uplink (UL) transmission service to multiple UEs. Different cells may be configured to provide different bandwidths. The eNB controls data transmission and reception to and from a plurality of UEs. For DL data, the eNB transmits DL scheduling information to notify a corresponding UE of time/frequency resources through which the data is to be transmitted, coding, data size, and hybrid automatic repeat and request (HARQ)-related information. For UL data, the eNB transmits UL scheduling information to a corresponding UE to inform the UE of available time/frequency resources, coding, data size, and HARQ-related information. An interface for transmitting user traffic or control traffic between eNBs may be used. A core network (CN) may include an AG and a network node for user registration for the UE. The AG manages mobility of the UE on a tracking area (TA) basis, each TA including a plurality of cells.” <i>Kim ’068</i> at [0007]. “In another aspect of the present invention, provided herein are a method including receiving the first message or the cluster head decision signal, receiving a second message, and receiving the D2D signal based on the control information contained in the second message, and a user equipment (UE) for implementing the same.” <i>Kim ’068</i> at [0026].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	“The UE which has performed the above procedures may receive a PDCCH/PDSCH signal (S307) and transmit a PUSCH/PUCCH signal (S308) according to a general UL/DL signal transmission procedure. In particular, the UE receives downlink control information (DCI) through the PDCCH. Herein, the CCI includes control information such as resource allocation information for the UE and comes in a different format according to the purpose thereof.” <i>Kim ’068</i> at [0062]. “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080]. “Random access response information is received using a method similar to the method used in the non contention-based random access procedure. That is, after transmitting the random access preamble as performed in step S401, the UE attempts to receive a random access response thereof within a random access response reception window indicated through the system information or an HO command by an eNB, and receives corresponding RA-RNTI information (S402). Thereby, the UE may receive a UL

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	grant, a temporary C-RNTI and a TAC.” <i>Kim</i> ’068 at [0087]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim</i> ’068, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[5a] determining, by at least one of the first UE or the second UE, at least one of a TC-RNTI or UL grant allocated thereto according to at least one of at least one TC-RNTI or at least one UL grant contained in the RAR; or monitoring, by at least one of the first UE or the second UE, the RAR corresponding to the preamble and sent by the eNB comprises: determining, by at least one of the first UE or the second UE, corresponding RA-RNTIs according to at least one of respective IDs or preambles, descrambling a CRC of DCI for scheduling the RAR according to the	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim</i> ’068 discloses determining, by at least one of the first UE or the second UE, at least one of a TC-RNTI or UL grant allocated thereto according to at least one of at least one TC-RNTI or at least one UL grant contained in the RAR; or monitoring, by at least one of the first UE or the second UE, the RAR corresponding to the preamble and sent by the eNB comprises: determining, by at least one of the first UE or the second UE, corresponding RA-RNTIs according to at least one of respective IDs or preambles, descrambling a CRC of DCI for scheduling the RAR according to the corresponding RA-RNTIs, and receiving corresponding RARs, the RAR comprising at least one of a TC-RNTI or a UL grant allocated to the first UE or second UE. See ’430 claim elements 1pre, 1b, 5pre. In addition, <i>Kim</i> ’068 discloses, e.g.: “In another aspect of the present invention, provided herein are a method including receiving the first message or the cluster head decision signal, receiving a second message, and receiving the D2D signal based on the control information contained in the second message, and a user equipment (UE) for implementing the same.” <i>Kim</i> ’068 at [0026]. “The UE which has performed the above procedures may receive a PDCCH/PDSCH signal (S307) and transmit a PUSCH/PUCCH signal (S308) according to a general UL/DL signal transmission procedure.

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
corresponding RA-RNTIs, and receiving corresponding RARs, the RAR comprising at least one of a TC-RNTI or a UL grant allocated to the first UE or second UE.	In particular, the UE receives downlink control information (DCI) through the PDCCH. Herein, the CCI includes control information such as resource allocation information for the UE and comes in a different format according to the purpose thereof.” <i>Kim ’068</i> at [0062]. “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080]. “The random access preamble ID is needed for a random access response since one random access response contains random access response information for one or more UEs. That is, it is necessary to announce a UE for which the UL grant, the temporary C-RNTI and the TAC are valid. In this step, it is assumed that the UE selects a random access preamble ID coinciding with a random access pre-amble the UE has selected in step S402.” <i>Kim ’068</i> at [0081]. “Random access response information is received using a method similar to the method used in the non

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	contention-based random access procedure. That is, after transmitting the random access preamble as performed in step S401, the UE attempts to receive a random access response thereof within a random access response reception window indicated through the system information or an HO command by an eNB, and receives corresponding RA-RNTI information (S402). Thereby, the UE may receive a UL grant, a temporary C-RNTI and a TAC.” <i>Kim ’068</i> at [0087]. “The UE processor of a D2D RX UE may control the RF unit of the D2D RX UE to monitor or detect msg2. The D2D RX UE processor may control the D2D RX UE RF unit to receive msg3 including a D2D signal based on msg2 or control information contained in msg2. The D2D RX UE processor may perform CRC checking for the control part (PDCCH/EPDCCH) for reception of msg3. If CRC checking is successful, the D2D RX UE processor may control the D2D RX UE RF unit to transmit ACK. If CRC checking fails, the D2D RX UE processor may control the D2D RX UE RF unit to transmit NACK.” <i>Kim ’068</i> at [0244]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim ’068</i>, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[6] The method according to claim 5, wherein determining, by at least one of the first UE or the second UE, at least one of the TC-RNTI or the UL grant allocated thereto according to at least one of at least one TC-RNTI or at least one UL	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim ’068</i> discloses wherein determining, by at least one of the first UE or the second UE, at least one of the TC-RNTI or the UL grant allocated thereto according to at least one of at least one TC-RNTI or at least one UL grant contained in the RAR comprises: determining, by at least one of the first UE or

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
grant contained in the RAR comprises: determining, by at least one of the first UE or the second UE, at least one of a TC-RNTI or a UL grant allocated thereto according to at least one of an ID of the first UE or the second UE in accordance with a pre-set rule.	the second UE, at least one of a TC-RNTI or a UL grant allocated thereto according to at least one of an ID of the first UE or the second UE in accordance with a pre-set rule. See ’430 claim elements 1pre, 1b, 5pre, and 5a. In addition, <i>Kim ’068</i> discloses, e.g.: “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080]. “The random access preamble ID is needed for a random access response since one random access response contains random access response information for one or more UEs. That is, it is necessary to announce a UE for which the UL grant, the temporary C-RNTI and the TAC are valid. In this step, it is assumed that the UE selects a random access preamble ID coinciding with a random access pre-amble the UE has selected in step S402.” <i>Kim ’068</i> at [0081].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	“Accordingly, in order to receive msg3, a special action is to be taken in advance. In particular, information for decoding and demodulating msg3 is necessary. For this reason, it is preferable for the Rx UEs to receive msg2, which serves to approve scheduling of msg3. That is, it is preferable to deliver, to the RX UEs, information capable of executing decoding and demodulation of msg3 (resource allocation, MCS, HARQ, transmission time, timing lapse, CP length, emergency indicator, hopping indicator, priority indicator, number of msg3 transmissions, retransmission timing, a HARQ response method, etc.) through msg2. In addition, before the msg2 and information for decoding and demodulation are delivered, the RX UEs need to receive msg2. Accordingly, it is preferable to pre-signal information about a time at which msg2 is transmitted or is likely to be transmitted, RNTI-related information (e.g., RA-RNTI for demasking PDCCH for msg2 if the PDCCH is masked with an RNTI, a range of RNTI values reserved for a D2D Tx UE or a certain allocated value), a Tx UE ID (when necessary), and information about msg1 of the TX UE (e.g., a time frequency resource index, a subframe, a radio frame, a UE ID, an IMSI), particularly, information used in scrambling and masking msg2.” <i>Kim ’068</i> at [0158]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim ’068</i>, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[7] The method according to claim 1, further comprising: after sending, by at least one of the first UE or the second UE, the message 3 according to the UL grant allocated thereto, receiving, by at least one of the first UE or the second	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with.

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
UE, a message 4 sent by the eNB.	<i>Kim ’068</i> discloses after sending, by at least one of the first UE or the second UE, the message 3 according to the UL grant allocated thereto, receiving, by at least one of the first UE or the second UE, a message 4 sent by the eNB. See ’430 claim elements 1pre, 1b, and 1c. In addition, <i>Kim ’068</i> discloses, e.g.: “When the UE accesses an eNB for the first time or there is no radio resource for signal transmission, the UE may perform a random access procedure for the eNB (S303 to S306). To this end, the UE may transmit a specific sequence as a preamble through a physical random access channel (PRACH) (S303 and S305) and receive a response message to the preamble through the PDCCH and the PDSCH corresponding to the PDCCH (S304 and S306). In a contention-based random access procedure, a contention resolution procedure may be additionally performed.” <i>Kim ’068</i> at [0061]. “A random access procedure that a UE performs with a specific eNB may include (1) the UE transmitting a random access preamble to the eNB (hereafter, referred to as transmission of ‘a first message (message 1)’ if there is no confusion), (2) receiving a random access response from the eNB in response to the transmitted random access preamble (hereafter, referred to as reception of ‘a second message (message 2)’ if there is no confusion), (3) transmitting a UL message using the information received through the random access response message (hereafter, referred to as transmission of ‘a third message (message 3)’ if there is no confusion) and (4) receiving a message corresponding to the UL message from the eNB (hereafter, referred to as reception of ‘a fourth message (message 4)’ if there is no confusion).” <i>Kim ’068</i> at [0072]. “(4) Reception of Message 4” <i>Kim ’068</i> at [0091]. “After transmitting the data including the ID of the UE through the UL grant included in the random access response, the UE awaits instruction from the eNB for contention resolution. That is, the UE attempts to receive a PDCCH in order to receive a specific message (S404). Two methods for receiving the PDCCH have been discussed. As described above, if message 3 is transmitted according to the UL grant using the ID of the UE or the cell ID, the UE may attempt to receive a PDCCH using the cell ID thereof. If the ID is a unique ID, the UE may attempt to receive a PDCCH using the temporary C-RNTI

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

	included in the random access response. In the former case, if the UE receives the PDCCH using the cell ID thereof before the contention resolution timer expires, the UE terminates the random access procedure, determining that the random access procedure has been normally performed. In the latter case, if the UE receives a PDCCH using the temporary C-RNTI before the contention resolution timer expires, the UE checks the data delivered through the PDSCH indicated by the PDCCH. If the data contains the unique ID of the UE, the UE terminates the random access procedure, determining that the random access procedure has been normally performed.” <i>Kim</i> ’068 at [0092]. “In one embodiment of the present invention, it is proposed that direct communication between UEs be implemented in a manner of broadcast, groupcast or group communication service by changing messages 1 to 4 of the legacy random access procedure as described below. Hereinafter, for simplicity of description, message 1, message 2, message 3 and message 4 are expressed as msg1, msg2, msg3 and msg4, respectively.” <i>Kim</i> ’068 at [0094]. “Msg4 (Step 4):” <i>Kim</i> ’068 at [0102]. “Step 4 represents an operation of assisting normal implementation of Step 3. Step 3 causes an operation to be performed according to whether signal reception is successful or according to a channel over which a signal is incorrectly received and a cause of incorrect signal reception. In some cases, the eNB may broadcast/groupcast, to D2D RX UES or an RX UE group, a message (msg3) transmitted in Step 3, at a transmission time of Step 4. Herein, the aforementioned signal may be referred to as msg4.” <i>Kim</i> ’068 at [0103]. “In the example illustrated in FIG. 6, the Tx UE receives msg2 and transmits msg3 to RX UES of a predetermined group. That is, in the example of FIG. 6, the Tx UE may directly deliver msg3 to RX UEs using resources assigned through msg2, without intervention of the eNB. When necessary, the RX UEs receiving msg3 may deliver msg4 to the Tx UE to signal whether or not reception of msg3 is successful.” <i>Kim</i> ’068 at [0109]. “Contrary to FIG. 6, FIG. 7 illustrates an exemplary case where a serving eNB in place of the TX UE transmits msg3 to a predetermined RX UE group. When necessary, the RX UEs receiving msg3 may deliver msg4 to the eNB to signal whether or not reception of msg3 is successful.” <i>Kim</i> ’068 at [0110].
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EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

	“Similar to FIG. 6, FIG. 8 illustrates an example of direct transmission of a broadcast/groupcast signal from a Tx UE. In the example of FIG. 8, the serving eNB also receives msg3 transmitted by the TX UE, and transmits msg.4 as necessary. As the eNB receives msg3, not only the Tx UE but also the eNB may become subjects to perform retransmission according to a HARQ retransmission request, as will be described later.” <i>Kim</i> ’068 at [0112]. “As described in the aforementioned operation, msg3 and msg4 may substantially correspond to a message that the Tx UE intends to deliver through broadcast and a corresponding acknowledgment, respectively.” <i>Kim</i> ’068 at [0156]. “When msg3 is delivered via a relay, the delivered msg3 is likely to take the form of msg4. Accordingly, the RX UE persistently performs monitoring at the msg4 delivery time to decode and demodulate msg4 (having a format including msg3 information or including a case where msg3 itself is transmitted) so as to finally obtain a broadcast message.” <i>Kim</i> ’068 at [0160]. “Alternatively, if msg4 is transmitted in the same format as msg3, this transmission may be considered as retransmission or repetitive transmission of msg3 rather than transmission of msg4.” <i>Kim</i> ’068 at [0161]. “Next, if msg2 is received, it is assumed that msg3 has been normally transmitted. Msg3 may be delivered from a TX UE to an eNB and RX UEs. Once the eNB receives msg3, the eNB may deliver msg4 to the Tx UE to signal whether or not reception is successful. Similarly, in the case of groupcast, RX UEs receiving msg3 may transmit msg.4 (wherein msg4 is a message delivered to the Tx UE by the RX UEs and may be identical to or different from a message which is delivered to the Tx UE by the eNB) to signal whether or not reception is successful. In the case of broadcast, the RX UEs may not perform msg4 transmission. Alternatively, the RX UEs may deliver, to the eNB, information indicating whether or not reception of msg4 is successful, and the eNB may collect the information and deliver the same to the Tx UE. In this method, it is assumed that the eNB is capable of receiving signals from all RX UEs relatively well. In this case, the eNB may become a device to finally determine whether or not msg3 is received. If msg3 is not properly delivered, the eNB may re-schedule msg2 such that msg3 transmission is attempted.” <i>Kim</i> ’068 at [0162].
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EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	“As another issue, if there is no response to transmitted msg3, this case is analyzed. No response is provided, namely the Tx UE does not receive msg4 for two major reasons: one reason may be that msg4 sent by the eNB is not capable of decoding the PDCCH, and the other one may be that the PDSCH is not decoded or demodulated.” <i>Kim</i> ’068 at [0163].
[8] The method according to claim 7, wherein receiving, by at least one of the first UE or the second UE, the message 4 sent by the eNB comprises: scrambling a CRC of DCI for scheduling the message 4 by using a TC-RNTI allocated to at least one of the first UE or the second UE.	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim</i> ’068 discloses wherein receiving, by at least one of the first UE or the second UE, the message 4 sent by the eNB comprises: scrambling a CRC of DCI for scheduling the message 4 by using a TC-RNTI allocated to at least one of the first UE or the second UE. See ’430 claim elements 1pre, 1b, 1c, and 7. In addition, <i>Kim</i> ’068 discloses, e.g.: “One or more cells are managed by one eNB. A cell is configured to use one of bandwidths of 1.25, 2.5, 5, 10, 15, and 20 MHz to provide a downlink (DL) or uplink (UL) transmission service to multiple UEs. Different cells may be configured to provide different bandwidths. The eNB controls data transmission and reception to and from a plurality of UEs. For DL data, the eNB transmits DL scheduling information to notify a corresponding UE of time/frequency resources through which the data is to be transmitted, coding, data size, and hybrid automatic repeat and request (HARQ)-related information. For UL data, the eNB transmits UL scheduling information to a corresponding UE to inform the UE of available time/frequency resources, coding, data size, and HARQ-related information. An interface for transmitting user traffic or control traffic between eNBs may be used. A core network (CN) may include an AG and a network node for user registration for the UE. The AG manages mobility of the UE on a tracking area (TA) basis, each TA including a plurality of cells.” <i>Kim</i> ’068 at [0007]. “When the UE accesses an eNB for the first time or there is no radio resource for signal transmission, the UE may perform a random access procedure for the eNB (S303 to S306). To this end, the UE may transmit a specific sequence as a preamble through a physical random access channel (PRACH) (S303

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	and S305) and receive a response message to the preamble through the PDCCH and the PDSCH corresponding to the PDCCH (S304 and S306). In a contention-based random access procedure, a contention resolution procedure may be additionally performed.” <i>Kim ’068</i> at [0061]. “After transmitting the data including the ID of the UE through the UL grant included in the random access response, the UE awaits instruction from the eNB for contention resolution. That is, the UE attempts to receive a PDCCH in order to receive a specific message (S404). Two methods for receiving the PDCCH have been discussed. As described above, if message 3 is transmitted according to the UL grant using the ID of the UE or the cell ID, the UE may attempt to receive a PDCCH using the cell ID thereof. If the ID is a unique ID, the UE may attempt to receive a PDCCH using the temporary C-RNTI included in the random access response. In the former case, if the UE receives the PDCCH using the cell ID thereof before the contention resolution timer expires, the UE terminates the random access procedure, determining that the random access procedure has been normally performed. In the latter case, if the UE receives a PDCCH using the temporary C-RNTI before the contention resolution timer expires, the UE checks the data delivered through the PDSCH indicated by the PDCCH. If the data contains the unique ID of the UE, the UE terminates the random access procedure, determining that the random access procedure has been normally performed.” <i>Kim ’068</i> at [0092]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim ’068</i>, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[9] The method according to claim 8, wherein the message 4 comprises at least one set of radio resources, radio resources allocated to at least one of	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim ’068</i> discloses wherein the message 4 comprises at least one set of radio resources, radio resources allocated to at least one of the first UE or the second UE are determined by at least one of the first UE

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
the first UE or the second UE are determined by at least one of the first UE or the second UE according to at least one set of radio resources in the message 4; or the message 4 comprises a set of radio resources allocated to the first UE or second UE.	or the second UE according to at least one set of radio resources in the message 4; or the message 4 comprises a set of radio resources allocated to the first UE or second UE. See ’430 claim elements 1pre, 1b, 1c, 7, and 8. In addition, <i>Kim</i> ’068 discloses, e.g.: “The ‘cell’ associated with the radio resources is defined by combination of downlink resources and uplink resources, that is, combination of DLCC and ULCC. The cell may be configured by downlink resources only, or may be configured by downlink resources and uplink resources. If carrier aggregation is Supported, linkage between a carrier frequency of the downlink resources (or DLCC) and a carrier frequency of the uplink resources (or ULCC) may be indicated by System information. In frequency division duplex (FDD), since the UL operation band is different from the DL operation band, different carrier frequencies are linked to constitute one cell, and SIB2 linkage designates, as a frequency of a UL CC, a frequency different from the frequency of a DL CC which the UE accesses. In other words, in the case of FDD, in a cell constituted by a DLCC and a ULCC linked to the DL CC, the DLCC and the UL CC operate at different frequencies. In time division duplex (TDD), the UL operation band is identical to the DL operation band. Accordingly, one carrier frequency constitutes one cell, and SIB2 linkage designates the frequency of a DL CC which the UE accesses as the frequency of a corresponding.” <i>Kim</i> ’068 at [0050]. “In this case, the carrier frequency means a center frequency of each cell or CC. A cell operating on a primary frequency may be referred to as a primary cell (Pcell) or PCC, and a cell operating on a secondary frequency may be referred to as a secondary cell (Scell) or SCC. The carrier corresponding to the Pcell on downlink will be referred to as a downlink primary CC (DL PCC), and the carrier corresponding to the Pcell on uplink will be referred to as an uplink primary CC (ULPCC). A Scell means a cell that may be configured after completion of radio resource control (RRC) connection establishment and used to provide additional radio resources. The Scell may form a set of serving cells for the UE together with the PCell in accordance with capabilities of the UE. The carrier corresponding to the Scell on the downlink will be referred to as downlink secondary CC (DLSCC), and the carrier corresponding to the Scell on the uplink will be referred to as uplink secondary CC (UL

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	SCC). Although the UE is in RRC-CONNECTED state, if it is not configured by carrier aggregation or does not support carrier aggregation, a single serving cell configured by the Pcell only exists.” <i>Kim</i> ’068 at [0051]. “A ‘cell’ of a geographic region may be understood as coverage within which a node can provide service using a carrier and a ‘cell’ of a radio resource is associated with bandwidth (BW) which is a frequency range configured by the carrier. Since DL coverage, which is a range within which the node is capable of transmitting a valid signal, and UL coverage, which is a range within which the node is capable of receiving the valid signal from the UE, depends upon a carrier carrying the signal, the coverage of the node may be associated with coverage of the ‘cell’ of a radio resource used by the node. Accordingly, the term ‘cell’ may be used to indicate service coverage of the node sometimes, a radio resource at other times, or a range that a signal using a radio resource can reach with valid strength at other times.” <i>Kim</i> ’068 at [0052]. “3GPP LTE/LTE-A standards define DL physical channels corresponding to resource elements carrying information derived from a higher layer and DL physical signals corresponding to resource elements which are used by a physical layer but which do not carry information derived from a higher layer. For example, a physical downlink shared channel (PDSCH), a physical broadcast channel (PBCH), a physical multicast channel (PMCH), a physical control format indicator channel (PCFICH), a physical downlink control channel (PDCCH), and a physical hybrid ARQ indicator channel (PHICH) are defined as the DL physical channels, and a reference signal and a synchronization signal are defined as the DL physical signals. A reference signal (RS), also called a pilot, refers to a special waveform of a predefined signal known to both a BS and a UE. For example, a cell-specific RS (CRS), a UE-specific RS (UE-RS), a positioning RS (PRS), and channel state information RS (CSI-RS) may be defined as DL RSs. Meanwhile, the 3GPP LTE/LTE-A standards define UL physical channels corresponding to resource elements carrying information derived from a higher layer and UL physical signals corresponding to resource elements which are used by a physical layer but which do not carry information derived from a higher layer. For example, a physical uplink shared channel (PUSCH), a physical uplink control channel (PUCCH), and a physical random access channel (PRACH) are defined as the UL physical channels, and a demodulation reference signal (DMRS) for a UL control/

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	data signal and a Sounding reference signal (SRS) used for UL channel measurement are defined as the UL physical signals.” <i>Kim ’068</i> at [0053]. “In the present invention, a physical downlink control channel (PDCCH), a physical control format indicator channel (PCFICH), a physical hybrid automatic retransmit request indicator channel (PHICH), and a physical downlink shared channel (PDSCH) refer to a set of time-frequency resources or resource elements (REs) carrying downlink control information (DCI), a set of time-frequency resources or REs carrying a control format indicator (CFI), a set of time-frequency resources or REs carrying downlink acknowledgement (ACK)/negative ACK (NACK), and a set of time-frequency resources or RES carrying downlink data, respectively. In addition, a physical uplink control channel (PUCCH), a physical uplink shared channel (PUSCH) and a physical random access channel (PRACH) refer to a set of time-frequency resources or RES carrying uplink control information (UCI), a set of time-frequency resources or Res carrying uplink data and a set of time-frequency resources or REs carrying random access signals, respectively. In the present invention, in particular, a time-frequency resource or RE that is assigned to or belongs to PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/PRACH is referred to as PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/ PRACH RE or PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/PRACH time-frequency resource, respectively. Therefore, in the present invention, PUCCH/PUSCH/ PRACH transmission of a UE is conceptually identical to UCI/uplink data/random access signal transmission on PUSCH/PUCCH/PRACH, respectively. In addition, PDCCH/PCFICH/PHICH/PDSCH transmission of an eNB is conceptually identical to downlink data/DCI transmission on PDCCH/PCFICH/PHICH/PDSCH, respectively.” <i>Kim ’068</i> at [0054]. “When the UE accesses an eNB for the first time or there is no radio resource for signal transmission, the UE may perform a random access procedure for the eNB (S303 to S306). To this end, the UE may transmit a specific sequence as a preamble through a physical random access channel (PRACH) (S303 and S305) and receive a response message to the preamble through the PDCCH and the PDSCH corresponding to the PDCCH (S304 and S306). In a contention-based random access procedure, a contention resolution procedure may be additionally performed.” <i>Kim ’068</i> at [0061].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	“After transmitting the data including the ID of the UE through the UL grant included in the random access response, the UE awaits instruction from the eNB for contention resolution. That is, the UE attempts to receive a PDCCH in order to receive a specific message (S404). Two methods for receiving the PDCCH have been discussed. As described above, if message 3 is transmitted according to the UL grant using the ID of the UE or the cell ID, the UE may attempt to receive a PDCCH using the cell ID thereof. If the ID is a unique ID, the UE may attempt to receive a PDCCH using the temporary C-RNTI included in the random access response. In the former case, if the UE receives the PDCCH using the cell ID thereof before the contention resolution timer expires, the UE terminates the random access procedure, determining that the random access procedure has been normally performed. In the latter case, if the UE receives a PDCCH using the temporary C-RNTI before the contention resolution timer expires, the UE checks the data delivered through the PDSCH indicated by the PDCCH. If the data contains the unique ID of the UE, the UE terminates the random access procedure, determining that the random access procedure has been normally performed.” <i>Kim</i> ’068 at [0092].
[10] The method according to claim 9, wherein the radio resources allocated to at least one of the first UE or the second UE are further determined by at least one of the first UE or the second UE according to an ID of at least one of the first UE or the second UE in accordance with a pre-set rule.	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim</i> ’068 discloses radio resources allocated to at least one of the first UE or the second UE are further determined by at least one of the first UE or the second UE according to an ID of at least one of the first UE or the second UE in accordance with a pre-set rule. See ’430 claim elements 1pre, 1b, 1c, 7, 8, and 9. In addition, <i>Kim</i> ’068 discloses, e.g.: “The ‘cell’ associated with the radio resources is defined by combination of downlink resources and uplink resources, that is, combination of DLCC and ULCC. The cell may be configured by downlink resources only, or may be configured by downlink resources and uplink resources. If carrier aggregation is Supported, linkage between a carrier frequency of the downlink resources (or DLCC) and a carrier frequency of the uplink resources (or ULCC) may be indicated by System information. In frequency division duplex (FDD), since the UL operation band is different from the DL operation band, different carrier frequencies are linked to constitute one cell, and SIB2 linkage designates, as a frequency of a UL CC, a frequency different from the frequency of a DL CC which the UE accesses. In

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	other words, in the case of FDD, in a cell constituted by a DLCC and a ULCC linked to the DL CC, the DLCC and the UL CC operate at different frequencies. In time division duplex (TDD), the UL operation band is identical to the DL operation band. Accordingly, one carrier frequency constitutes one cell, and SIB2 linkage designates the frequency of a DL CC which the UE accesses as the frequency of a corresponding.” <i>Kim ’068</i> at [0050]. “In this case, the carrier frequency means a center frequency of each cell or CC. A cell operating on a primary frequency may be referred to as a primary cell (Pcell) or PCC, and a cell operating on a secondary frequency may be referred to as a secondary cell (Scell) or SCC. The carrier corresponding to the Pcell on downlink will be referred to as a downlink primary CC (DL PCC), and the carrier corresponding to the Pcell on uplink will be referred to as an uplink primary CC (ULPCC). A Scell means a cell that may be configured after completion of radio resource control (RRC) connection establishment and used to provide additional radio resources. The Scell may form a set of serving cells for the UE together with the PCell in accordance with capabilities of the UE. The carrier corresponding to the Scell on the downlink will be referred to as downlink secondary CC (DLSCC), and the carrier corresponding to the Scell on the uplink will be referred to as uplink secondary CC (ULSCC). Although the UE is in RRC-CONNECTED state, if it is not configured by carrier aggregation or does not support carrier aggregation, a single serving cell configured by the Pcell only exists.” <i>Kim ’068</i> at [0051]. “A ‘cell’ of a geographic region may be understood as coverage within which a node can provide service using a carrier and a ‘cell’ of a radio resource is associated with bandwidth (BW) which is a frequency range configured by the carrier. Since DL coverage, which is a range within which the node is capable of transmitting a valid signal, and UL coverage, which is a range within which the node is capable of receiving the valid signal from the UE, depends upon a carrier carrying the signal, the coverage of the node may be associated with coverage of the ‘cell’ of a radio resource used by the node. Accordingly, the term ‘cell’ may be used to indicate service coverage of the node sometimes, a radio resource at other times, or a range that a signal using a radio resource can reach with valid strength at other times.” <i>Kim ’068</i> at [0052].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	“3GPP LTE/LTE-A standards define DL physical channels corresponding to resource elements carrying information derived from a higher layer and DL physical signals corresponding to resource elements which are used by a physical layer but which do not carry information derived from a higher layer. For example, a physical downlink shared channel (PDSCH), a physical broadcast channel (PBCH), a physical multicast channel (PMCH), a physical control format indicator channel (PCFICH), a physical downlink control channel (PDCCH), and a physical hybrid ARQ indicator channel (PHICH) are defined as the DL physical channels, and a reference signal and a synchronization signal are defined as the DL physical signals. A reference signal (RS), also called a pilot, refers to a special waveform of a predefined signal known to both a BS and a UE. For example, a cell-specific RS (CRS), a UE-specific RS (UE-RS), a positioning RS (PRS), and channel state information RS (CSI-RS) may be defined as DL RSs. Meanwhile, the 3GPP LTE/LTE-A standards define UL physical channels corresponding to resource elements carrying information derived from a higher layer and UL physical signals corresponding to resource elements which are used by a physical layer but which do not carry information derived from a higher layer. For example, a physical uplink shared channel (PUSCH), a physical uplink control channel (PUCCH), and a physical random access channel (PRACH) are defined as the UL physical channels, and a demodulation reference signal (DMRS) for a UL control/data signal and a Sounding reference signal (SRS) used for UL channel measurement are defined as the UL physical signals.” <i>Kim</i> ’068 at [0053]. “In the present invention, a physical downlink control channel (PDCCH), a physical control format indicator channel (PCFICH), a physical hybrid automatic retransmit request indicator channel (PHICH), and a physical downlink shared channel (PDSCH) refer to a set of time-frequency resources or resource elements (REs) carrying downlink control information (DCI), a set of time-frequency resources or REs carrying a control format indicator (CFI), a set of time-frequency resources or REs carrying downlink acknowledgement (ACK)/negative ACK (NACK), and a set of time-frequency resources or REs carrying downlink data, respectively. In addition, a physical uplink control channel (PUCCH), a physical uplink shared channel (PUSCH) and a physical random access channel (PRACH) refer to a set of time-frequency resources or REs carrying uplink control information (UCI), a set of time-frequency resources or REs carrying uplink data and a set of time-frequency resources or REs carrying random access signals, respectively. In the present invention, in particular, a time-frequency resource or RE that is assigned to or belongs to PDCCH/PCFICH/

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

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	PHICH/PDSCH/PUCCH/PUSCH/PRACH is referred to as PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/ PRACH RE or PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/PRACH time-frequency resource, respectively. Therefore, in the present invention, PUCCH/PUSCH/ PRACH transmission of a UE is conceptually identical to UCI/uplink data/random access signal transmission on PUSCH/PUCCH/PRACH, respectively. In addition, PDCCH/PCFICH/PHICH/PDSCH transmission of an eNB is conceptually identical to downlink data/DCI transmission on PDCCH/PCFICH/PHICH/PDSCH, respectively.” <i>Kim ’068</i> at [0054]. “When the UE accesses an eNB for the first time or there is no radio resource for signal transmission, the UE may perform a random access procedure for the eNB (S303 to S306). To this end, the UE may transmit a specific sequence as a preamble through a physical random access channel (PRACH) (S303 and S305) and receive a response message to the preamble through the PDCCH and the PDSCH corresponding to the PDCCH (S304 and S306). In a contention-based random access procedure, a contention resolution procedure may be additionally performed.” <i>Kim ’068</i> at [0061]. “After transmitting the data including the ID of the UE through the UL grant included in the random access response, the UE awaits instruction from the eNB for contention resolution. That is, the UE attempts to receive a PDCCH in order to receive a specific message (S404). Two methods for receiving the PDCCH have been discussed. As described above, if message 3 is transmitted according to the UL grant using the ID of the UE or the cell ID, the UE may attempt to receive a PDCCH using the cell ID thereof. If the ID is a unique ID, the UE may attempt to receive a PDCCH using the temporary C-RNTI included in the random access response. In the former case, if the UE receives the PDCCH using the cell ID thereof before the contention resolution timer expires, the UE terminates the random access procedure, determining that the random access procedure has been normally performed. In the latter case, if the UE receives a PDCCH using the temporary C-RNTI before the contention resolution timer expires, the UE checks the data delivered through the PDSCH indicated by the PDCCH. If the data contains the unique ID of the UE, the UE terminates the random access procedure, determining that the random access procedure has been normally performed.” <i>Kim ’068</i> at [0092].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	“Transmission of msg1 may be performed using a pre-designated time and resource (as in the case of LTE RACH access slot pre-configuration, namely PRACH recon-figuration), or may be performed using a time and resource determined based on a unique attribute (e.g., ID) of the UE. Alternatively, transmission may be performed based on information broadcast by the cluster head with a periodicity. For example, if an RX UE detects a specific cluster head and desires to operate in a group to which the cluster head belongs, the UE identifies a resource for a Tx UE to use to perform broadcast by monitoring the broadcast information of the cluster head. The cluster head may transmit D2D access configuration information for msg1 through a beacon, a synchronization channel, or a broadcast channel. This operation may be similar to a preliminary procedure through which the PRACH configuration should be received before transmission of the PRACH preamble. Meanwhile, configuration information containing timing information about msg1, msg2, msg3 and msg4 may be pre-provided to all D2D UEs. This method may be implemented through operation and management (OAM) or a broadcast signal.” <i>Kim</i> ’068 at [0188]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim</i> ’068, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[11] The method according to claim 7, further comprising: after receiving, by at least one of the first UE or the second UE, the message 4 sent by the eNB, sending, by at least one of the first UE or the second UE, an indicating signal for notifying the eNB of a	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim</i> ’068 discloses after receiving, by at least one of the first UE or the second UE, the message 4 sent by the eNB, sending, by at least one of the first UE or the second UE, an indicating signal for notifying

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

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successful access of at least one of the first UE or the second UE to the eNB, wherein the indicating signal is a Scheduling Request (SR) or an Acknowledgement (ACK) signal.	the eNB of a successful access of at least one of the first UE or the second UE to the eNB, wherein the indicating signal is a Scheduling Request (SR) or an Acknowledgement (ACK) signal. See ’430 claim elements 1pre, 1b, 1c, and 7. In addition, <i>Kim ’068</i> discloses, e.g.: “One or more cells are managed by one eNB. A cell is configured to use one of bandwidths of 1.25, 2.5, 5, 10, 15, and 20 MHz to provide a downlink (DL) or uplink (UL) transmission service to multiple UEs. Different cells may be configured to provide different bandwidths. The eNB controls data transmission and reception to and from a plurality of UEs. For DL data, the eNB transmits DL scheduling information to notify a corresponding UE of time/frequency resources through which the data is to be transmitted, coding, data size, and hybrid automatic repeat and request (HARQ)-related information. For UL data, the eNB transmits UL scheduling information to a corresponding UE to inform the UE of available time/frequency resources, coding, data size, and HARQ-related information. An interface for transmitting user traffic or control traffic between eNBs may be used. A core network (CN) may include an AG and a network node for user registration for the UE. The AG manages mobility of the UE on a tracking area (TA) basis, each TA including a plurality of cells.” <i>Kim ’068</i> at [0007]. “In the present invention, a physical downlink control channel (PDCCH), a physical control format indicator channel (PCFICH), a physical hybrid automatic retransmit request indicator channel (PHICH), and a physical downlink shared channel (PDSCH) refer to a set of time-frequency resources or resource elements (REs) carrying downlink control information (DCI), a set of time-frequency resources or REs carrying a control format indicator (CFI), a set of time-frequency resources or REs carrying downlink acknowledgement (ACK)/negative ACK (NACK), and a set of time-frequency resources or RES carrying downlink data, respectively. In addition, a physical uplink control channel (PUCCH), a physical uplink shared channel (PUSCH) and a physical random access channel (PRACH) refer to a set of time-frequency resources or RES carrying uplink control information (UCI), a set of time-frequency resources or Res carrying uplink data and a set of time-frequency resources or REs carrying random access signals, respectively. In the present invention, in particular, a time-frequency resource or RE that is assigned to or belongs to PDCCH/PCFICH/

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

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	PHICH/PDSCH/PUCCH/PUSCH/PRACH is referred to as PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/ PRACH RE or PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/PRACH time-frequency resource, respectively. Therefore, in the present invention, PUCCH/PUSCH/ PRACH transmission of a UE is conceptually identical to UCI/uplink data/random access signal transmission on PUSCH/PUCCH/PRACH, respectively. In addition, PDCCH/PCFICH/PHICH/PDSCH transmission of an eNB is conceptually identical to downlink data/DCI transmission on PDCCH/PCFICH/PHICH/PDSCH, respectively.” <i>Kim</i> ’068 at [0054]. “The UE which has performed the above procedures may receive a PDCCH/PDSCH signal (S307) and transmit a PUSCH/PUCCH signal (S308) according to a general UL/DL signal transmission procedure. In particular, the UE receives downlink control information (DCI) through the PDCCH. Herein, the CCI includes control information such as resource allocation information for the UE and comes in a different format according to the purpose thereof.” <i>Kim</i> ’068 at [0062]. “Control information that the UE transmits to the eNB or receives from the eNB through uplink includes a UL/DL acknowledgement (ACK)/negative ACK (NACK) signal and channel state information (CSI) Such as a channel quality indicator (CQI), a precoding matrix (PMI) and a rank indicator (RI). For the 3GPP LTE system, the UE may transmit the ACK/NACK signal and only control information (UCI) such as the CSI over a PUSCH and/or PUCCH.” <i>Kim</i> ’068 at [0063]. “In the example illustrated in FIG. 6, the Tx UE receives msg2 and transmits msg3 to RX UEs of a prede-termined group. That is, in the example of FIG. 6, the Tx UE may directly deliver msg3 to RX UEs using resources assigned through msg2, without intervention of the eNB. When necessary, the RX UEs receiving msg3 may deliver msg4 to the Tx UE to signal whether or not reception of msg3 is successful.” <i>Kim</i> ’068 at [0109].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

	“As described in the aforementioned operation, msg3 and msg4 may substantially correspond to a message that the Tx UE intends to deliver through broadcast and a corresponding acknowledgment, respectively.” <i>Kim</i> ’068 at [0156]. “When reception of msg3 fails outside the coverage, the RX UE needs to make a response thereto. When trans-mitted msg3 consists of a control part (PDCCH) and a data part (PDSCH), msg3 reception failure may be classified into a case of an error in the control part (PDCCH/EPDCCH) and a case of an error in the data part (PDSCH/PUSCH). Herein, the HARQ operation is applicable to the data part. To simplify the system, the only the case of an error in the control part may be considered. If checking the cyclic redundancy check (CRC) for the control part is successful, ACK may be fed back. If the checking fails, NACK may be fed back. For example, the RX UE may perform CRC checking for the control part (PDCCH or EPDCCH) masked based on a virtual ID and feed back ACK or NACK according to the result of CRC checking. A message used for a feedback signal is called msg4. That is, in this embodiment, msg4 is used as alternative information for checking if msg3 reception is successful. Thereby, msg4 is used to determine not only whether the control part is received but also whether the data part is received. Of course, successful reception of the control part does not guarantee Successful reception of the data part. However, it is expected that the probability of reception of the control part will be similar to that of reception of the data part in most cases. Accordingly, error checking may be sufficiently performed based on the control part alone.” <i>Kim</i> ’068 at [0221]. “Next, the data part (e.g., PDSCH or PUSCh car-rying msg3) may not be decoded and thus an error may occur. In this case, msg4 may be used to finally signal whether or not decoding is successful. For broadcast and groupcast, however, it may not be necessary to check final information acquisition. That is, management of broadcast or groupcast may be sufficiently performed even if only delivery of control information such as the control part (PDCCH/EPDCCH) is checked and an acknowledgment is sent based on the checking.” <i>Kim</i> ’068 at [0222]. “Referring to FIG. 13, when multiple Tx UEs per form broadcast and multiple Rx UEs receive broadcast signals, UE3 may redundantly receive msg3 messages since msg3 is transmitted from two TX UEs simultaneously. As a result, UE3 may fail to properly receive msg3. In this case,
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EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	when it is assumed that UE3 recognizes presence of cluster head A and cluster head B, UE3 may transmit msg4 to report NACK for both msg3 messages. In this embodiment, it is assumed that UE3 which is accurately aware of the timing of reception of msg3 from both cluster heads is capable of recognizing collision caused by simultaneous transmission of msg3 when the msg3 reception times coincide. In this case, msg4 may be fed back in a manner that NACK is scrambled with a cluster head UE ID or virtual ID and then transmitted.” <i>Kim ’068</i> at [0227]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim ’068</i>, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[12] The method according to claim 7, further comprising: after receiving, by at least one of the first UE or the second UE, the message 4 sent by the eNB, receiving, by at least one of the first UE or the second UE, indicating information, sent by the eNB, for indicating re-initiation of a random access of at least one of the first UE or the second UE.	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with.

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	<i>Kim</i> ’068 discloses after receiving, by at least one of the first UE or the second UE, the message 4 sent by the eNB, receiving, by at least one of the first UE or the second UE, indicating information, sent by the eNB, for indicating re-initiation of a random access of at least one of the first UE or the second UE. See ’430 claim elements 1pre, 1b, 1c, and 7. In addition, <i>Kim</i> ’068 discloses, e.g.: “Step 4 represents an operation of assisting normal implementation of Step 3. Step 3 causes an operation to be performed according to whether signal reception is success-ful or according to a channel over which a signal is incur-rectly received and a cause of incorrect signal reception. In some cases, the eNB may broadcast/groupcast, to D2D RX UES or an RX UE group, a message (msg3) transmitted in Step 3, at a transmission time of Step 4. Herein, the aforementioned signal may be referred to as msg4.” <i>Kim</i> ’068 at [0103]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim</i> ’068, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[13] The method according to claim 7, wherein the message 3 and the message 4 comprise a group ID of the UE group or a pre-set field.	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with.

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

	<i>Kim</i> ’068 discloses the message 3 and the message 4 comprise a group ID of the UE group or a pre-set field. See ’430 claim elements 1pre, 1b, 1c, and 7. In addition, <i>Kim</i> ’068 discloses, e.g.: “(3) Transmission of Message 3” <i>Kim</i> ’068 at [0088]. “If the UE receives a valid random access response, the UE processes the information included in the random access response. That is, the UE applies the TAC and stores the temporary C-RNTI. In addition, the UE transmits data (i.e., message 3) to the eNB using the UL grant (S403). Message 3 should include an ID of the UE. This is because the eNB cannot determine which UEs perform the random access procedure in the contention-based random access procedure and the UEs need to be identified for future contention resolution.” <i>Kim</i> ’068 at [0089]. “Two methods to include the ID of the UE in message 3 have been discussed. According to a first method, if the UE has a valid cell ID assigned thereto in a corresponding cell before the random access procedure, the UE transmits the cell ID thereof via a UL transmission signal corresponding to the UL grant. On the other hand, if the UE has not been assigned a valid cell ID before the random access procedure, the UE transmits its unique ID (e.g., System Architecture Evolution (SAE)-Temporary Mobile Subscriber Identity (S-TMSI) or a random ID) in the message. In general, the unique ID is longer than the cell ID. Once the UE has transmitted data corresponding to the UL grant, the UE starts a contention resolution timer.” <i>Kim</i> ’068 at [0090]. “Alternatively, if msg4 is transmitted in the same format as msg3, this transmission may be considered as retransmission or repetitive transmission of msg3 rather than transmission of msg4.” <i>Kim</i> ’068 at [0161]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim</i> ’068, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and
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EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[14] The method according to claim 1, further comprising: before sending, by the first UE in the UE group, the preamble over the time-frequency resource, receiving, by at least one of the first UE or the second UE, Downlink Control Information (DCI) or a paging message or a Radio Resource Control (RRC) message sent by the eNB; or, receiving, by the first UE, random access request information sent by the second UE.	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim ’068</i> discloses further comprising: before sending, by the first UE in the UE group, the preamble over the time-frequency resource, receiving, by at least one of the first UE or the second UE, Downlink Control Information (DCI) or a paging message or a Radio Resource Control (RRC) message sent by the eNB; or, receiving, by the first UE, random access request information sent by the second UE. See ’430 claim elements 1pre and 1a. In addition, <i>Kim ’068</i> discloses, e.g.: “The ‘cell’ associated with the radio resources is defined by combination of downlink resources and uplink resources, that is, combination of DLCC and ULCC. The cell may be configured by downlink resources only, or may be configured by downlink resources and uplink resources. If carrier aggregation is Supported, linkage between a carrier frequency of the downlink resources (or DLCC) and a carrier frequency of the uplink resources (or ULCC) may be indicated by System information. In frequency division duplex (FDD), since the UL operation band is different from the DL operation band, different carrier frequencies are linked to constitute one cell, and SIB2 linkage designates, as a frequency of a UL CC, a frequency different from the frequency of a DL CC which the UE accesses. In other words, in the case of FDD, in a cell constituted by a DLCC and a ULCC linked to the DL CC, the DLCC and the UL CC operate at different frequencies. In time division duplex (TDD), the UL operation band is identical to the DL operation band. Accordingly, one carrier frequency constitutes one cell, and SIB2 linkage designates the frequency of a DL CC which the UE accesses as the frequency of a corresponding.” <i>Kim ’068</i> at [0050]. “In this case, the carrier frequency means a center frequency of each cell or CC. A cell operating on a primary frequency may be referred to as a primary cell (Pcell) or PCC, and a cell operating on a secondary frequency may be referred to as a secondary cell (Scell) or SCC. The carrier

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	corresponding to the Pcell on downlink will be referred to as a downlink primary CC (DL PCC), and the carrier corresponding to the Pcell on uplink will be referred to as an uplink primary CC (ULPCC). A Scell means a cell that may be configured after completion of radio resource control (RRC) connection establishment and used to provide additional radio resources. The Scell may form a set of serving cells for the UE together with the PCell in accordance with capabilities of the UE. The carrier corresponding to the Scell on the downlink will be referred to as downlink secondary CC (DLSCC), and the carrier corresponding to the Scell on the uplink will be referred to as uplink secondary CC (ULSCC). Although the UE is in RRC-CONNECTED state, if it is not configured by carrier aggregation or does not support carrier aggregation, a single serving cell configured by the Pcell only exists.” <i>Kim ’068</i> at [0051]. “A ‘cell’ of a geographic region may be understood as coverage within which a node can provide service using a carrier and a ‘cell’ of a radio resource is associated with bandwidth (BW) which is a frequency range configured by the carrier. Since DL coverage, which is a range within which the node is capable of transmitting a valid signal, and UL coverage, which is a range within which the node is capable of receiving the valid signal from the UE, depends upon a carrier carrying the signal, the coverage of the node may be associated with coverage of the ‘cell’ of a radio resource used by the node. Accordingly, the term ‘cell’ may be used to indicate service coverage of the node sometimes, a radio resource at other times, or a range that a signal using a radio resource can reach with valid strength at other times.” <i>Kim ’068</i> at [0052]. “3GPP LTE/LTE-A standards define DL physical channels corresponding to resource elements carrying information derived from a higher layer and DL physical signals corresponding to resource elements which are used by a physical layer but which do not carry information derived from a higher layer. For example, a physical downlink shared channel (PDSCH), a physical broadcast channel (PBCH), a physical multicast channel (PMCH), a physical control format indicator channel (PCFICH), a physical downlink control channel (PDCCH), and a physical hybrid ARQ indicator channel (PHICH) are defined as the DL physical channels, and a reference signal and a synchronization signal are defined as the DL physical signals. A reference signal (RS), also called a pilot, refers to a special waveform of a predefined signal known to both a BS and a UE. For example, a cell-specific RS (CRS), a UE-specific RS (UE-RS), a positioning RS (PRS), and channel state information RS (CSI-RS) may

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	be defined as DL RSs. Meanwhile, the 3GPP LTE/LTE-A standards define UL physical channels corresponding to resource elements carrying information derived from a higher layer and UL physical signals corresponding to resource elements which are used by a physical layer but which do not carry information derived from a higher layer. For example, a physical uplink shared channel (PUSCH), a physical uplink control channel (PUCCH), and a physical random access channel (PRACH) are defined as the UL physical channels, and a demodulation reference signal (DMRS) for a UL control/data signal and a sounding reference signal (SRS) used for UL channel measurement are defined as the UL physical signals.” <i>Kim ’068</i> at [0053]. “In the present invention, a physical downlink control channel (PDCCH), a physical control format indicator channel (PCFICH), a physical hybrid automatic retransmit request indicator channel (PHICH), and a physical downlink shared channel (PDSCH) refer to a set of time-frequency resources or resource elements (REs) carrying downlink control information (DCI), a set of time-frequency resources or REs carrying a control format indicator (CFI), a set of time-frequency resources or REs carrying downlink acknowledgement (ACK)/negative ACK (NACK), and a set of time-frequency resources or REs carrying downlink data, respectively. In addition, a physical uplink control channel (PUCCH), a physical uplink shared channel (PUSCH) and a physical random access channel (PRACH) refer to a set of time-frequency resources or REs carrying uplink control information (UCI), a set of time-frequency resources or REs carrying uplink data and a set of time-frequency resources or REs carrying random access signals, respectively. In the present invention, in particular, a time-frequency resource or RE that is assigned to or belongs to PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/PRACH is referred to as PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/ PRACH RE or PDCCH/PCFICH/PHICH/PDSCH/PUCCH/PUSCH/PRACH time-frequency resource, respectively. Therefore, in the present invention, PUCCH/PUSCH/ PRACH transmission of a UE is conceptually identical to UCI/uplink data/random access signal transmission on PUSCH/PUCCH/PRACH, respectively. In addition, PDCCH/PCFICH/PHICH/PDSCH transmission of an eNB is conceptually identical to downlink data/DCI transmission on PDCCH/PCFICH/PHICH/PDSCH, respectively.” <i>Kim ’068</i> at [0054].

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068)

	“The UE which has performed the above procedures may receive a PDCCH/PDSCH signal (S307) and transmit a PUSCH/PUCCH signal (S308) according to a general UL/DL signal transmission procedure. In particular, the UE receives downlink control information (DCI) through the PDCCH. Herein, the CCI includes control information such as resource allocation information for the UE and comes in a different format according to the purpose thereof.” <i>Kim</i> ’068 at [0062]. “In selecting a random access preamble in the LTE system, both a contention-based random access procedure, through which the UE selects one preamble to use within a specific set, and a non-contention-based random access procedure, through which a random access preamble allocated to a specific UE by the eNB is used, are provided. The non-contention-based random access procedure may be used only in the HO procedure or only when the procedure is requested according to a command from the eNB.” <i>Kim</i> ’068 at [0071]. “FIG. 4 specifically illustrates operations of the UE and the eNB in the non-contention-based random access procedure.” <i>Kim</i> ’068 at [0073]. “(1) Assignment of a Random Access Preamble” <i>Kim</i> ’068 at [0074]. “As described above, the non-contention-based random access procedure may be performed (1) in the HO procedure, and (2) when the procedure is requested by a command from the eNB. Of course, the contention-based random access procedure may also be performed in both cases.” <i>Kim</i> ’068 at [0075]. “To ensure the non-contention-based random access procedure, it is important to receive a designated random access preamble which has no possibility of collision from the eNB. The random access preamble may be indicated to the UE through an HO command or a PDCCH command. Thereby, the random access preamble is assigned to the UE (S401).” <i>Kim</i> ’068 at [0076]. “After the UE is assigned a random access preamble solely designated thereto, the UE transmits the designated random access preamble to the eNB (S402).” <i>Kim</i> ’068 at [0078].
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EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	“After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080]. “The random access preamble ID is needed for a random access response since one random access response contains random access response information for one or more UEs. That is, it is necessary to announce a UE for which the UL grant, the temporary C-RNTI and the TAC are valid. In this step, it is assumed that the UE selects a random access preamble ID coinciding with a random access preamble the UE has selected in step S402.” <i>Kim ’068</i> at [0081]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim ’068</i>, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[15] The method according to claim 14, wherein receiving, by at least one of the first UE or the second UE, the DCI or the paging message or the RRC message sent by the eNB comprises at least one of the following: the DCI or a CRC of DCI for scheduling the paging message or the RRC message is scrambled by using a group ID of the UE group; the DCI or the paging message or the RRC message comprises a group ID of the UE group; the DCI or the paging message or the RRC message comprises an ID of at least one of the first UE or the second UE; or the DCI or the paging message or the RRC message comprises at least one of an ID of the preamble, the time domain resource of the preamble or	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim</i> ’068 discloses wherein receiving, by at least one of the first UE or the second UE, the DCI or the paging message or the RRC message sent by the eNB comprises at least one of the following: the DCI or a CRC of DCI for scheduling the paging message or the RRC message is scrambled by using a group ID of the UE group; the DCI or the paging message or the RRC message comprises a group ID of the UE group; the DCI or the paging message or the RRC message comprises an ID of at least one of the first UE or the second UE; or the DCI or the paging message or the RRC message comprises at least one of an ID of the preamble, the time domain resource of the preamble or the frequency domain resource of the preamble. See ’430 claim elements 1pre, 1a, and 14. In addition, <i>Kim</i> ’068 discloses, e.g.: “One or more cells are managed by one eNB. A cell is configured to use one of bandwidths of 1.25, 2.5, 5, 10, 15, and 20 MHz to provide a downlink (DL) or uplink (UL) transmission service to multiple UEs. Different cells may be configured to provide different bandwidths. The eNB controls data transmission and reception to and from a plurality of UEs. For DL data, the eNB transmits DL scheduling information to notify a corresponding UE of time/frequency resources through which the data is to be transmitted, coding, data size, and hybrid automatic repeat and request (HARQ)-related information. For UL data, the eNB transmits UL scheduling information to a corresponding UE to inform the UE of available time/frequency resources, coding, data size, and HARQ-related information. An interface for transmitting user traffic or control traffic between eNBs may be used. A core network (CN) may include an AG and a network node for user registration for the UE. The AG

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
the frequency domain resource of the preamble.	manages mobility of the UE on a tracking area (TA) basis, each TA including a plurality of cells.” <i>Kim ’068</i> at [0007]. “The UE which has performed the above procedures may receive a PDCCH/PDSCH signal (S307) and transmit a PUSCH/PUCCH signal (S308) according to a general UL/DL signal transmission procedure. In particular, the UE receives downlink control information (DCI) through the PDCCH. Herein, the CCI includes control information such as resource allocation information for the UE and comes in a different format according to the purpose thereof.” <i>Kim ’068</i> at [0062]. “In selecting a random access preamble in the LTE system, both a contention-based random access procedure, through which the UE selects one preamble to use within a specific set, and a non-contention-based random access procedure, through which a random access preamble allocated to a specific UE by the eNB is used, are provided. The non-contention-based random access procedure may be used only in the HO procedure or only when the procedure is requested according to a command from the eNB.” <i>Kim ’068</i> at [0071]. “FIG. 4 specifically illustrates operations of the UE and the eNB in the non-contention-based random access procedure.” <i>Kim ’068</i> at [0073]. “(1) Assignment of a Random Access Preamble” <i>’068</i> at [0074]. “As described above, the non-contention-based random access procedure may be performed (1) in the HO procedure, and (2) when the procedure is requested by a command from the eNB. Of course, the contention-based random access procedure may also be performed in both cases.” <i>Kim ’068</i> at [0075]. “To ensure the non-contention-based random access procedure, it is important to receive a designated random access preamble which has no possibility of collision from the eNB. The random access

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

	preamble may be indicated to the UE through an HO command or a PDCCH command. Thereby, the random access preamble is assigned to the UE (S401).” <i>Kim ’068</i> at [0076]. “After the UE is assigned a random access preamble solely designated thereto, the UE transmits the designated random access preamble to the eNB (S402).” <i>Kim ’068</i> at [0078]. “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080]. “The random access preamble ID is needed for a random access response since one random access response contains random access response information for one or more UEs. That is, it is necessary to announce a UE for which the UL grant, the temporary C-RNTI and the TAC are valid. In this step, it is assumed that the UE selects a random access preamble ID coinciding with a random access preamble the UE has selected in step S402.” <i>Kim ’068</i> at [0081].
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EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim</i> ’068, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.
[17] The method according to claim 1, wherein sending, by the first UE in the UE group, the preamble over the time-frequency resource comprises: periodically sending, by the first UE, the preamble over the frequency domain resource.	
[18pre] A User Equipment (UE), comprising: a sending unit and a monitoring unit,	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim</i> ’068 discloses a User Equipment (UE), comprising: a sending unit and a monitoring unit. See ’430 claim element 1pre. In addition, <i>Kim</i> ’068 discloses, e.g.: “The present invention provides a method whereby user equipment located outside network coverage or in partial network coverage performs device-to-device (D2D) communication. The user equipment, which has a D2D signal to transmit, can send a request for resource allocation for the transmission of the D2D signal to user equipment configured as a cluster head, or become a cluster head itself. The user equipment, which has the D2D signal to transmit, can transmit the D2D signal according to the resource allocation by the cluster head or resource allocation performed by becoming a cluster head

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

	itself. Other user equipment receives the D2D signal by receiving or overhearing information on the resource allocation from the cluster head.” <i>Kim ’068</i> at [Abstract]. “To this end, operations in an LTE system to which the present invention is applicable will be reviewed and then a method for efficiently performing D2D communication using a random access procedure (also referred to as a random access channel (RACH) procedure) in the LTE system will be proposed.” <i>Kim ’068</i> at [0057]. “FIGS. 4 and 5 specifically illustrate a random access procedure used in the present invention.” <i>Kim ’068</i> at [0064]. “The UE performs the random access procedure in the following cases.” <i>Kim ’068</i> at [0065]. “In selecting a random access preamble in the LTE system, both a contention-based random access procedure, through which the UE selects one preamble to use within a specific set, and a non-contention-based random access procedure, through which a random access preamble allocated to a specific UE by the eNB is used, are provided. The non-contention-based random access procedure may be used only in the HO procedure or only when the procedure is requested according to a command from the eNB.” <i>Kim ’068</i> at [0071]. “A random access procedure that a UE performs with a specific eNB may include (1) the UE transmitting a random access preamble to the eNB (hereafter, referred to as transmission of ‘a first message (message 1)’ if there is no confusion), (2) receiving a random access response from the eNB in response to the transmitted random access preamble (hereafter, referred to as reception of ‘a second message (message 2)’ if there is no confusion), (3) transmitting a UL message using the information received through the random access response message (hereafter, referred to as transmission of ‘a third message (message 3)’ if there is no confusion) and (4) receiving a message corresponding to the UL message from the eNB (hereafter, referred to as reception of ‘a fourth message (message 4)’ if there is no confusion).” <i>Kim ’068</i> at [0072]. “FIG. 17 is a block diagram illustrating elements of a transmitting device 10 and a receiving device 20 for implementing the present invention.” <i>Kim ’068</i> at [0234].
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EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim* ’068)

	“The transmitting device 10 and the receiving device 20 respectively include Radio Frequency (RF) units 13 and 23 capable of transmitting and receiving radio signals carrying information, data, signals, and/or messages, memories 12 and 22 for storing information related to communication in a wireless communication system, and processors 11 and 21 operationally connected to elements such as the RF units 13 and 23 and the memories 12 and 22 to control the elements and configured to control the memories 12 and 22 and/or the RF units 13 and 23 so that a corresponding device may perform at least one of the above-described embodiments of the present invention.” <i>Kim</i> ’068 at [0235]. “The processors 11 and 21 generally control the overall operation of various modules in the transmitting device and the receiving device. Especially, the processors 11 and 21 may perform various control functions to implement the present invention. The processors 11 and 21 may be referred to as controllers, microcontrollers, microprocessors, or microcomputers. The processors 11 and 21 may be implemented by hardware, firmware, software, or a combination thereof. In a hardware configuration, application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), or field programmable gate arrays (FPGAs) may be included in the processors 11 and 21. Meanwhile, if the present invention is implemented using firmware or software, the firmware or software may be configured to include modules, procedures, functions, etc. performing the functions or operations of the present invention. Firmware or software configured to perform the present invention may be included in the processors 11 and 21 or stored in the memories 12 and 22 so as to be driven by the processors 11 and 21.” <i>Kim</i> ’068 at [0237]. “The processor 11 of the transmitting device 10 performs predetermined coding and modulation for a signal and/or data scheduled to be transmitted to the outside by the processor 11 or a scheduler connected with the processor 11, and then transfers the coded and modulated data to the RF unit 13. For example, the processor 11 converts a data stream to be transmitted into Nlayer layers through demultiplexing, channel coding, scrambling, and modulation. The coded data stream is also referred to as a codeword and is equivalent to a transport block which is a data block provided by a MAC layer. One transport block (TB) is coded into one codeword and each codeword is transmitted to the receiving device in the form of one or more layers. For frequency up-conversion, the RF unit 13 may
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EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim ’068</i> ”)
	include an oscillator. The RF unit 13 may include Nt (where Nt is a positive integer) transmit antennas.” <i>Kim ’068</i> at [0238].
[18a] wherein the sending unit is configured to: send a preamble to an evolved Node B (eNB) over a time-frequency resource, the time-frequency resource comprising a time domain resource and a frequency domain resource;	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim ’068</i> discloses wherein the sending unit is configured to: send a preamble to an evolved Node B (eNB) over a time-frequency resource, the time-frequency resource comprising a time domain resource and a frequency domain resource. See ’430 claim element 1pre, 1a, and 18pre. In addition, <i>Kim ’068</i> discloses, e.g.: “The UE is fixed or mobile. The UE is a device that transmits and receives user data and/or various kinds of control information through communication with a base station (BS). The term “UE may be replaced with terminal equipment, Mobile Station (MS), Mobile Terminal (MT), User Terminal (UT), Subscriber Station (SS), wireless device, Personal Digital Assistant (PDA), wireless modem, handheld device, etc. A BS is typically a fixed station that communicates with a UE and/or another BS. The BS exchanges data and control information with a UE and another BS. The term BS may be replaced with Advanced Base Station (ABS), Node B', 'evolved-Node B (eNB), Base Transceiver System (BTS), Access Point (AP), Processing Server (PS), etc. In the following description, BS is commonly called eNB.” <i>Kim ’068</i> at [0006]. “One or more cells are managed by one eNB. A cell is configured to use one of bandwidths of 1.25, 2.5, 5, 10, 15, and 20 MHz to provide a downlink (DL) or uplink (UL) transmission service to multiple UEs. Different cells may be configured to provide different bandwidths. The eNB controls data transmission and reception to and from a plurality of UEs. For DL data, the eNB transmits DL scheduling information to notify a corresponding UE of time/frequency resources through which the data is to be transmitted, coding, data size, and hybrid automatic repeat and request (HARQ)-related information. For UL data, the eNB transmits UL scheduling information to a corresponding UE to inform the UE of available time/frequency resources, coding, data size, and HARQ-related

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)

’430 Patent	U.S. Patent Publication No. 2016/0374068 (“Kim ’068”)
	information. An interface for transmitting user traffic or control traffic between eNBs may be used. A core network (CN) may include an AG and a network node for user registration for the UE. The AG manages mobility of the UE on a tracking area (TA) basis, each TA including a plurality of cells.” <i>Kim ’068</i> at [0007]. “In addition, in the present invention, a PBCH/(e) PDCCH/PDSCH/PUCCH/PUSCH region refers to a time frequency resource region to which PBCH/(e)PDCCH/ PDSCH/PUCCH/PUSCH has been mapped or may be mapped.” <i>Kim ’068</i> at [0055]. “FIG. 5 is a diagram illustrating operations of the UE and the eNB performed in the condition-based random access procedure.” <i>Kim ’068</i> at [0083]. “(1) Transmission of Message 1” <i>Kim ’068</i> at [0084]. “A UE may randomly select a random access preamble from a set of random access preambles indicated through system information or an HO command, and select and transmit a physical RACH (PRACH) resource on which the random access preamble may be transmitted (S501).” <i>Kim ’068</i> at [0085]. “Resources for D2D communication may be assigned by an eNB. To this end, a transmission (Tx) UE performing D2D communication may make a request to the eNB for a radio resource, and the eNB may assign a resource in response. Thereby, the Tx UE may transmit signals to one or more reception (RX) UES through the assigned resource. In the following description, a method for a Tx UE to randomly access an eNB in a manner different from the aforementioned typical D2D communication or in a manner similar to the random access procedure to initiate D2D communication is proposed.” <i>Kim ’068</i> at [0093]. “In FIGS. 6 and 7, a Tx UE may transmit, to an eNB, msg1 thereof similar to a random access preamble in a preconfigured resource interval to initiate D2D communication. The eNB receiving msg1 of the

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

	Tx UE may be a serving eNB providing a service to the Tx UE, and may support D2D communication broadcast/groupcast of the TX UE.” <i>Kim ’068</i> at [0107]. “According to embodiments of the present invention, it is proposed that a TX UE randomly select a signature from among predetermined signatures received through system information as in the case of the random access pre-amble of LTE and transmit msg1 through a resource randomly selected from among predetermined time-frequency resource.” <i>Kim ’068</i> at [0115]. “In the embodiments of the present invention, a UE operates as the transmitting device 10 in UL and as the receiving device 20 in DL. In the embodiments of the present invention, an eNB operates as the receiving device 20 in UL and as the transmitting device 10 in DL. Hereinafter, a processor, an RF unit, and a memory included in the UE will be referred to as a UE processor, a UE RF unit, and a UE memory, respectively, and a processor, an RF unit, and a memory included in the eNB will be referred to as an eNB processor, an eNB RF unit, and an eNB memory, respectively.” <i>Kim ’068</i> at [241]. “The UE processor of a D2D Tx UE having a D2D signal to transmit may control the D2D Tx UE RF unit to generate a request for resource assignment for transmission of the D2D signal to a UE configured as a cluster head and to transmit msg1 containing the resource assignment request. The D2D Tx UE processor may control the D2D Tx UE RF unit to receive msg2 containing control information necessary for transmission of the D2D signal. The D2D Tx UE processor may control the D2D Tx RF unit to broadcast or groupcast msg3 containing the D2D signal based on msg2 or the control information. In some cases, the D2D Tx UE processor may control the D2D Tx UE RF unit to receive a HARQ acknowledgment of msg3.” <i>Kim ’068</i> at [242]. “The D2D Tx UE processor having a D2D signal to transmit may become a cluster head to schedule a resource for transmission of msg3. The D2D Tx UE processor may control the D2D Tx UE RF unit to broadcast a cluster head decision/negotiation signal containing information corresponding to the intention of becoming a cluster head. The cluster head decision/negotiation signal may contain an indicator indicating that the D2D signal has the highest priority, and a priority level indicator and/or an emergency call indicator that correspond to an emergency call. The D2D Tx UE processor may perform scheduling for transmission of the D2D signal. For example, the D2D Tx UE processor having become the cluster head may determine radio resources such as time, frequency and/or power for
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'430 Patent	U.S. Patent Publication No. 2016/0374068 (“ <i>Kim</i> ’068”)
	transmission of the D2D signal. The D2D Tx UE processor having become the cluster head may control the D2D Tx UE RF unit to transmit a signal or message (e.g., msg2) contain information indicating the radio resources. The D2D Tx UE processor may set the range of the UE cluster for broadcast of the D2D signal, and control the D2D Tx UE RF unit to transmit information about the range of the UE cluster. The D2D Tx UE processor may determine an On duration or Off duration of the UE cluster, and control the D2D Tx UE RF unit to transmit information indicating the On/Off duration. The D2D Tx UE processor may control the D2D Tx RF unit to transmit msg3 including the D2D signal using the radio resources.” <i>Kim</i> ’068 at [0243].
[18b] the monitoring unit is configured to: monitor a Random Access Response (RAR) corresponding to the preamble and sent by the eNB; and	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with. <i>Kim</i> ’068 discloses the monitoring unit is configured to: monitor a Random Access Response (RAR) corresponding to the preamble and sent by the eNB. See ’430 claim element 1pre, 1a, 18pre, and 18a. In addition, <i>Kim</i> ’068 discloses, e.g.: “A random access procedure that a UE performs with a specific eNB may include (1) the UE transmitting a random access preamble to the eNB (hereafter, referred to as transmission of ‘a first message (message 1)’ if there is no confusion), (2) receiving a random access response from the eNB in response to the transmitted random access preamble (hereafter, referred to as reception of ‘a second message (message 2)’ if there is no confusion), (3) transmitting a UL message using the information received through the random access response message (hereafter, referred to as transmiss-ion of ‘a third message (message 3)’ if there is no confu-sion) and (4) receiving a message corresponding to the

EXHIBIT B2

Invalidity of U.S. Patent No. 10,448,430 in View of U.S. Patent Publication No. 2016/0374068 (“*Kim ’068*”)

	UL message from the eNB (hereafter, referred to as reception of ‘a fourth message (message 4)’ if there is no confusion).” <i>Kim ’068</i> at [0072]. “FIG. 4 specifically illustrates operations of the UE and the eNB in the non-contention-based random access procedure.” <i>Kim ’068</i> at [0073]. “(2) Transmission of Message 1” <i>Kim ’068</i> at [0077]. “After the UE is assigned a random access preamble solely designated thereto, the UE transmits the designated random access preamble to the eNB (S402).” <i>Kim ’068</i> at [0078]. “Reception of Message 2” <i>Kim ’068</i> at [0079]. “After transmitting the random access preamble in step S402, the UE attempts to receive a random access response directed thereto within a random access response window indicated by the eNB through system information or an HO command (S403). More specifically, the random access response information may be transmitted in the form of media access control (MAC) protocol data unit (PDU). The MAC PDU may be delivered over a PDSCH. In addition, in order to properly receive information delivered over the PDSCH, the UE monitors the PDCCH. Herein, the monitoring operation refers to an attempt to decode each PDCCH candidate within a time-frequency resource set where the PDCCH may be present according to all monitored DCI formats. The time-frequency resource set in which the UE may discover a PDCCH thereof in a subframe is referred to as a search space. Individual resources on which the PDCCH may be transmitted in the search space are referred to as PDCCH candidates. A set of PDCCH candidates for the UE to monitor is defined as the search space. The PDCCH carries information about a UE to receive the PDCCH, information about the frequency and time of a radio resource of the PDSCH, and DCI such as the transmission format of the PDSCH. Once the UE succeeds in receiving the PDCCH transmitted thereto, the UE may properly receive a random access response transmitted over the PDSCH according to the information on the PDCCH. The random access response may include a random access preamble ID (e.g., a random access radio network temporary identifier (RA-RNTI)), a UL grant indicating a UL resource, a cell radio network temporary identifier (C-RNTI) and a timing advance command (TAC).” <i>Kim ’068</i> at [0080].
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EXHIBIT B2

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	“FIG. 5 is a diagram illustrating operations of the UE and the eNB performed in the condition-based random access procedure.” <i>Kim</i> ’068 at [0083]. “(1) Transmission of Message 1” <i>Kim</i> ’068 at [0084]. “A UE may randomly select a random access pre-amble from a set of random access preambles indicated through system information or an HO command, and select and transmit a physical RACH (PRACH) resource on which the random access preamble may be transmitted (S501).” <i>Kim</i> ’068 at [0085]. “(2) Reception of Message 2” <i>Kim</i> ’068 at [0086]. “Random access response information is received using a method similar to the method used in the non contention-based random access procedure. That is, after transmitting the random access preamble as performed in step S401, the UE attempts to receive a random access response thereof within a random access response reception window indicated through the system information or an HO command by an eNB, and receives corresponding RA-RNTI information (S402). Thereby, the UE may receive a UL grant, a temporary C-RNTI and a TAC.” <i>Kim</i> ’068 at [0087]. “In the embodiments of the present invention, a UE operates as the transmitting device 10 in UL and as the receiving device 20 in DL. In the embodiments of the present invention, an eNB operates as the receiving device 20 in UL and as the transmitting device 10 in DL. Hereinafter, a processor, an RF unit, and a memory included in the UE will be referred to as a UE processor, a UE RF unit, and a UE memory, respectively, and a processor, an RF unit, and a memory included in the eNB will be referred to as an eNB processor, an eNB RF unit, and an eNB memory, respectively.” <i>Kim</i> ’068 at [241]. “The UE processor of a D2D Tx UE having a D2D signal to transmit may control the D2D Tx UE RF unit to generate a request for resource assignment for transmission of the D2D signal to a UE configured as a cluster head and to transmit msg1 containing the resource assignment request. The D2D Tx UE processor may control the D2D Tx UE RF unit to receive msg2 containing control information necessary for transmission of the D2D signal. The D2D Tx UE processor may control the D2D Tx RF unit to broadcast or groupcast msg3 containing the D2D signal based on msg2 or the
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EXHIBIT B2

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	control information. In some cases, the D2D Tx UE processor may control the D2D Tx UE RF unit to receive a HARQ acknowledgment of msg3.” <i>Kim ’068</i> at [242]. “The D2D Tx UE processor having a D2D signal to transmit may become a cluster head to schedule a resource for transmission of msg3. The D2D Tx UE processor may control the D2D Tx UE RF unit to broadcast a cluster head decision/negotiation signal containing information corresponding to the intention of becoming a cluster head. The cluster head decision/negotiation signal may contain an indicator indicating that the D2D signal has the highest priority, and a priority level indicator and/or an emergency call indicator that correspond to an emergency call. The D2D Tx UE processor may perform scheduling for transmission of the D2D signal. For example, the D2D Tx UE processor having become the cluster head may determine radio resources such as time, frequency and/or power for transmission of the D2D signal. The D2D Tx UE processor having become the cluster head may control the D2D Tx UE RF unit to transmit a signal or message (e.g., msg2) contain information indicating the radio resources. The D2D Tx UE processor may set the range of the UE cluster for broadcast of the D2D signal, and control the D2D Tx UE RF unit to transmit information about the range of the UE cluster. The D2D Tx UE processor may determine an On duration or Off duration of the UE cluster, and control the D2D Tx UE RF unit to transmit information indicating the On/Off duration. The D2D Tx UE processor may control the D2D Tx RF unit to transmit msg3 including the D2D signal using the radio resources.” <i>Kim ’068</i> at [243]. “The UE processor of a D2D Rx UE may control the RF unit of the D2D Rx UE to monitor or detect msg2. The D2D Rx UE processor may control the D2D Rx UE RF unit to receive msg3 including a D2D signal based on msg2 or control information contained in msg2. The D2D Rx UE processor may perform CRC checking for the control part (PDCCH/EPDCCH) for reception of msg3. If CRC checking is successful, the D2D Rx UE processor may control the D2D Rx UE RF unit to transmit ACK. If CRC checking fails, the D2D Rx UE processor may control the D2D Rx UE RF unit to transmit NACK.” <i>Kim ’068</i> at [244].
[18c] the sending unit is further configured to: send a message 3 according to a Uplink (UL) grant allocated to the UE, wherein the	The Court has not yet construed the claims and therefore the meaning of the terms in the claims has yet to be resolved by the Court. The support identified here for this limitation is responsive to Plaintiff’s infringement contentions, which Defendants disagree with.

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message 3 comprises a number of UEs having random access requests in a UE group or a number of UEs contained in the UE group or a pre-set UE number.	<i>Kim</i> ’068 discloses the sending unit is further configured to: send a message 3 according to a Uplink (UL) grant allocated to the UE, wherein the message 3 comprises a number of UEs having random access requests in a UE group or a number of UEs contained in the UE group or a pre-set UE number. See ’430 claim element 1pre, 1a, 1b, 18pre, 18a, and 18b. In addition, <i>Kim</i> ’068 discloses, e.g.: “In the embodiments of the present invention, a UE operates as the transmitting device 10 in UL and as the receiving device 20 in DL. In the embodiments of the present invention, an eNB operates as the receiving device 20 in UL and as the transmitting device 10 in DL. Hereinafter, a processor, an RF unit, and a memory included in the UE will be referred to as a UE processor, a UE RF unit, and a UE memory, respectively, and a processor, an RF unit, and a memory included in the eNB will be referred to as an eNB processor, an eNB RF unit, and an eNB memory, respectively.” <i>Kim</i> ’068 at [241]. “The UE processor of a D2D Tx UE having a D2D signal to transmit may control the D2D Tx UE RF unit to generate a request for resource assignment for transmission of the D2D signal to a UE configured as a cluster head and to transmit msg1 containing the resource assignment request. The D2D Tx UE processor may control the D2D Tx UE RF unit to receive msg2 containing control information necessary for transmission of the D2D signal. The D2D Tx UE processor may control the D2D Tx RF unit to broadcast or groupcast msg3 containing the D2D signal based on msg2 or the control information. In some cases, the D2D Tx UE processor may control the D2D Tx UE RF unit to receive a HARQ acknowledgment of msg3.” <i>Kim</i> ’068 at [242]. “The D2D Tx UE processor having a D2D signal to transmit may become a cluster head to schedule a resource for transmission of msg3. The D2D Tx UE processor may control the D2D Tx UE RF unit to broadcast a cluster head decision/negotiation signal containing information corresponding to the intention of becoming a cluster head. The cluster head decision/negotiation signal may contain an indicator indicating that the D2D signal has the highest priority, and a priority level indicator and/or an emergency call indicator that correspond to an emergency call. The D2D Tx UE processor may perform scheduling for transmission of the D2D signal. For example, the D2D Tx UE processor having become the cluster head may determine radio resources such as time, frequency and/or power for transmission of the D2D signal. The D2D Tx UE processor having become the cluster head may

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	control the D2D Tx UE RF unit to transmit a signal or message (e.g., msg2) contain information indicating the radio resources. The D2D Tx UE processor may set the range of the UE cluster for broadcast of the D2D signal, and control the D2D Tx UE RF unit to transmit information about the range of the UE cluster. The D2D Tx UE processor may determine an On duration or Off duration of the UE cluster, and control the D2D Tx UE RF unit to transmit information indicating the On/Off duration. The D2D Tx UE processor may control the D2D Tx RF unit to transmit msg3 including the D2D signal using the radio resources.” <i>Kim</i> ’068 at [243]. “The UE processor of a D2D Rx UE may control the RF unit of the D2D Rx UE to monitor or detect msg2. The D2D Rx UE processor may control the D2D Rx UE RF unit to receive msg3 including a D2D signal based on msg2 or control information contained in msg2. The D2D Rx UE processor may perform CRC checking for the control part (PDCCH/EPDCCH) for reception of msg3. If CRC checking is successful, the D2D Rx UE processor may control the D2D Rx UE RF unit to transmit ACK. If CRC checking fails, the D2D Rx UE processor may control the D2D Rx UE RF unit to transmit NACK.” <i>Kim</i> ’068 at [244]. To the extent that this limitation is not disclosed, either explicitly or inherently, by <i>Kim</i> ’068, this limitation is obvious in combination with the knowledge of one of skill in the art and/or it would have been obvious to one of skill in the art at the time of the ’430 patent to combine this reference with any of the other references in Appendix B as charted for this claim limitation. The motivations to combine may come from the knowledge of the person of ordinary skill themselves, or from known problems and predictable solutions as embodied in these references, examples of which are discussed in the Cover Pleading.