

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

The Accused LGE '247 Products are those that are compatible with the 5G-NR standard, and specifically with 3GPP TS 38.321 and 3GPP TS 38.212. An exemplary identification of the Accused LGE '247 Products, based on the information presently available, is set forth in Plaintiff Pantech Corporation's Patent Rule 3-1 and 3-2 Infringement Contentions, at Section A.

The Exemplary Evidence of Infringement disclosed herein establishes that asserted claims 1, 2, 8, 11, 12 and 18 of U.S. Patent No. 10,869,247 are essential to mandatory sections of the 5G-NR standard (i.e., 3GPP TS 38.321 and 3GPP TS 38.212). If "a patent covers mandatory aspects of a standard," it is "enough to prove infringement by showing standard compliance." *Godo Kaisha IP Bridge 1 v. TCL Commun. Tech. Holdings Ltd.*, 967 F.3d 1380, 1383-84 (Fed. Cir. 2020) ("In cases involving standard essential patents, we have endorsed standard compliance as a way of proving infringement"). Based on publicly available information, the Accused LGE '247 Products comply with the 5G-NR standard, which requires compliance with 5G-NR cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212 and perform cellular communications in compliance with the aforementioned 5G-NR cellular communication standards. *See* Appendix 1: LGE Products Compliance with Standards.

The Exemplary Evidence of Infringement also establishes that each of the Accused LGE '247 Products contains a chipset, application processor, SoC, or system-on-chip (referred to herein as the "chipset") that incorporates a processor and/or modem. Each such chipset (and thus each accused device) complies with one or more of 5G-NR cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212. *See* Appendix 1: LGE Products Components. Furthermore, each of the Accused LGE '247 Products contains an antenna or antennas, memory, and transceiver or combination of transmitter and receiver that assist performing cellular communications in accordance with the 5G-NR Release 15 or later cellular communication standard. *See* Appendix 1: LGE Products Components.

Thus, Appendix 1, taken together with the showing made herein, demonstrates infringement of U.S. Patent No. 10,869,247 by the Accused LGE '247 Products.

| U.S. Patent No.<br>10,869,247                               | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                        |
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| [1.pre] A wireless transmit/receive unit (WTRU) comprising: | <p>To the extent the preamble is construed as a limitation, each of the Accused LGE '247 Products is a user equipment that would have a wireless transmit/receive unit.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a chipset, antenna or antennas, memory, and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard.</p> |

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| U.S. Patent No.<br>10,869,247                                                                     | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| [1.a] at least one transceiver; and                                                               | <p>Each of the Accused LGE '247 Products is a user equipment that would have at least one transceiver.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard.</p>                                                                                                                                                                                                                                                                                                                                                    |
| [1.b] a processor;                                                                                | <p>Each of the Accused LGE '247 Products is a user equipment that would have a processor.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a processor that operate in accordance with 5G-NR cellular standard.</p>                                                                                                                                                                                                                                                                                                                                                                                                              |
| [1.c] wherein the at least one transceiver and the processor are configured to cause the WTRU to: | <p>Each of the Accused LGE '247 Products is a user equipment that would have at least one transceiver and the processor configured to cause the WTRU to comply with the following limitations as described below.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a processor and a transceiver or combination of transmitter and receiver that cause the WTRU to operate in accordance with 5G-NR cellular standard.</p>                                                                                                                                                                                                       |
| [1.d] transmit, using a hybrid automatic repeat request (H-ARQ) process, a data block to a base   | <p>Each of the Accused LGE '247 Products is a user equipment that would have a wireless transmit/receive unit to transmit, using a hybrid automatic repeat request (H-ARQ) process, a data block to a base station.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a chipset, antenna or antennas, memory, and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and supports a</p> |

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| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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| station;                      | <p>wireless transmit/receive unit to transmit, using a hybrid automatic repeat request (H-ARQ) process, a data block to a base station.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> <p><b>5.4.2 HARQ operation</b></p> <p><b>5.4.2.1 HARQ Entity</b></p> <p>The MAC entity includes a HARQ entity for each Serving Cell with configured uplink (including the case when it is configured with <i>supplementaryUplink</i>), which maintains a number of parallel HARQ processes.</p> <p>The number of parallel UL HARQ processes per HARQ entity is specified in TS 38.214 [7].</p> <p>Each HARQ process supports one TB.</p> <p>Each HARQ process is associated with a HARQ process identifier. For UL transmission with UL grant in RA Response, HARQ process identifier 0 is used.</p> <p>When the MAC entity is configured with <i>pusch-AggregationFactor</i> &gt; 1, the parameter <i>pusch-AggregationFactor</i> provides the number of transmissions of a TB within a bundle of the dynamic grant. After the initial transmission, <i>pusch-AggregationFactor</i> – 1 HARQ retransmissions follow within a bundle. When the MAC entity is configured with <i>repK</i> &gt; 1, the parameter <i>repK</i> provides the number of transmissions of a TB within a bundle of the configured uplink grant. After the initial transmission, HARQ retransmissions follow within a bundle. For both dynamic grant and configured uplink grant, bundling operation relies on the HARQ entity for invoking the same HARQ process for each transmission that is part of the same bundle. Within a bundle, HARQ retransmissions are triggered without waiting for feedback from previous transmission according to <i>pusch-AggregationFactor</i> for a dynamic grant and <i>repK</i> for a configured uplink grant, respectively. Each transmission within a bundle is a separate uplink grant after the initial uplink grant within a bundle is delivered to the HARQ entity.</p> <p>For each transmission within a bundle of the dynamic grant, the sequence of redundancy versions is determined according to clause 6.1.2.1 of TS 38.214 [7]. For each transmission within a bundle of the configured uplink grant, the sequence of redundancy versions is determined according to clause 6.1.2.3 of TS 38.214 [7].</p> <p>3GPP TS 38.321 v15.8.0 at 28.</p> |

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| U.S. Patent No.<br>10,869,247                                      | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                                                                    | <p>New transmissions are performed on the resource and with the MCS indicated on either PDCCH, Random Access Response, or RRC. Retransmissions are performed on the resource and, if provided, with the MCS indicated on PDCCH, or on the same resource and with the same MCS as was used for last made transmission attempt within a bundle.</p> <p>If the HARQ entity requests a new transmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; store the MAC PDU in the associated HARQ buffer;</li> <li>1&gt; store the uplink grant received from the HARQ entity;</li> <li>1&gt; generate a transmission as described below.</li> </ul> <p>If the HARQ entity requests a retransmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; store the uplink grant received from the HARQ entity;</li> <li>1&gt; generate a transmission as described below.</li> </ul> <p>To generate a transmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; if the MAC PDU was obtained from the Msg3 buffer; or</li> <li>1&gt; if there is no measurement gap at the time of the transmission and, in case of retransmission, the retransmission does not collide with a transmission for a MAC PDU obtained from the Msg3 buffer;</li> <li>2&gt; instruct the physical layer to generate a transmission according to the stored uplink grant.</li> </ul> <p>3GPP TS 38.321 v15.8.0 at 30.</p> |
| [1.e] receive uplink scheduling information from the base station, | <p>Each of the Accused LGE '247 Products is a user equipment that would have a wireless transmit/receive unit to receive uplink scheduling information from the base station.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a chipset, antenna or antennas, memory, and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and supports a</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

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| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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|                               | <p>wireless transmit/receive unit to receive uplink scheduling information from the base station.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> <p><b>5.4 UL-SCH data transfer</b></p> <p><b>5.4.1 UL Grant reception</b></p> <p>Uplink grant is either received dynamically on the PDCCH, in a Random Access Response, or configured semi-persistently by RRC. The MAC entity shall have an uplink grant to transmit on the UL-SCH. To perform the requested transmissions, the MAC layer receives HARQ information from lower layers.</p> <p>If the MAC entity has a C-RNTI, a Temporary C-RNTI, or CS-RNTI, the MAC entity shall for each PDCCH occasion and for each Serving Cell belonging to a TAG that has a running <i>timeAlignmentTimer</i> and for each grant received for this PDCCH occasion:</p> <ul style="list-style-type: none"> <li>1&gt; if an uplink grant for this Serving Cell has been received on the PDCCH for the MAC entity's C-RNTI or Temporary C-RNTI; or</li> <li>1&gt; if an uplink grant has been received in a Random Access Response: <ul style="list-style-type: none"> <li>2&gt; if the uplink grant is for MAC entity's C-RNTI and if the previous uplink grant delivered to the HARQ entity for the same HARQ process was either an uplink grant received for the MAC entity's CS-RNTI or a configured uplink grant: <ul style="list-style-type: none"> <li>3&gt; consider the NDI to have been toggled for the corresponding HARQ process regardless of the value of the NDI.</li> </ul> </li> <li>2&gt; if the uplink grant is for MAC entity's C-RNTI, and the identified HARQ process is configured for a configured uplink grant: <ul style="list-style-type: none"> <li>3&gt; start or restart the <i>configuredGrantTimer</i> for the corresponding HARQ process, if configured.</li> </ul> </li> </ul> </li> <li>2&gt; deliver the uplink grant and the associated HARQ information to the HARQ entity.</li> </ul> <p>3GPP TS 38.321 v15.8.0 at 27.</p> |

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| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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|                               | <p data-bbox="457 305 814 332">&lt;3GPP TS 38.212 v15.8.0&gt;</p> <p data-bbox="506 418 1241 462"><b>7.3 Downlink control information</b></p> <p data-bbox="506 495 1478 522">A DCI transports downlink control information for one or more cells with one RNTI.</p> <p data-bbox="506 555 1020 583">The following coding steps can be identified:</p> <ul data-bbox="543 615 974 813" style="list-style-type: none"><li>- Information element multiplexing</li><li>- CRC attachment</li><li>- Channel coding</li><li>- Rate matching</li></ul> <p data-bbox="457 873 858 901">3GPP TS 38.212 v15.8.0 at 74.</p> |

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| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
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|                               | <p data-bbox="499 310 844 345"><b>7.3.1 DCI formats</b></p> <p data-bbox="499 371 1083 401">The DCI formats defined in table 7.3.1-1 are supported.</p> <p data-bbox="968 435 1289 459" style="text-align: center;"><b>Table 7.3.1-1: DCI formats</b></p> <table data-bbox="642 485 1614 854"> <tr> <th data-bbox="642 485 966 542">DCI format</th><th data-bbox="966 485 1614 542">Usage</th></tr> <tr> <td data-bbox="642 542 966 571">0_0</td><td data-bbox="966 542 1614 571">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 571 966 600">0_1</td><td data-bbox="966 571 1614 600">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 600 966 630">1_0</td><td data-bbox="966 600 1614 630">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 630 966 659">1_1</td><td data-bbox="966 630 1614 659">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 659 966 688">2_0</td><td data-bbox="966 659 1614 688">Notifying a group of UEs of the slot format</td></tr> <tr> <td data-bbox="642 688 966 769">2_1</td><td data-bbox="966 688 1614 769">Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE</td></tr> <tr> <td data-bbox="642 769 966 799">2_2</td><td data-bbox="966 769 1614 799">Transmission of TPC commands for PUCCH and PUSCH</td></tr> <tr> <td data-bbox="642 799 966 854">2_3</td><td data-bbox="966 799 1614 854">Transmission of a group of TPC commands for SRS transmissions by one or more UEs</td></tr> </table> <p data-bbox="457 917 858 946">3GPP TS 38.212 v15.8.0 at 74.</p> | DCI format | Usage | 0_0 | Scheduling of PUSCH in one cell | 0_1 | Scheduling of PUSCH in one cell | 1_0 | Scheduling of PDSCH in one cell | 1_1 | Scheduling of PDSCH in one cell | 2_0 | Notifying a group of UEs of the slot format | 2_1 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | 2_2 | Transmission of TPC commands for PUCCH and PUSCH | 2_3 | Transmission of a group of TPC commands for SRS transmissions by one or more UEs |
| DCI format                    | Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_0                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_1                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_0                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_1                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_0                           | Notifying a group of UEs of the slot format                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_1                           | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_2                           | Transmission of TPC commands for PUCCH and PUSCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_3                           | Transmission of a group of TPC commands for SRS transmissions by one or more UEs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|                               | <p>7.3.1.1 DCI formats for scheduling of PUSCH</p> <p>7.3.1.1.1 Format 0_0</p> <p>DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <p>The following information is transmitted by means of the DCI format 0_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:</p> <ul style="list-style-type: none"> <li>- Identifier for DCI formats – 1 bit</li> <li>- The value of this bit field is always set to 0, indicating an UL DCI format</li> <li>- Frequency domain resource assignment – <math>\lceil \log_2(N_{RB}^{UL,BWP}(N_{RB}^{UL,BWP} + 1)/2) \rceil</math> bits where <math>N_{RB}^{UL,BWP}</math> is defined in subclause 7.3.1.0</li> <li>- For PUSCH hopping with resource allocation type 1:</li> </ul> |

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| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                               | <ul style="list-style-type: none"> <li>- <math>N_{UL\_hop}</math> MSB bits are used to indicate the frequency offset according to Subclause 6.3 of [6, TS 38.214], where <math>N_{UL\_hop} = 1</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains two offset values and <math>N_{UL\_hop} = 2</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains four offset values</li> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil - N_{UL\_hop}</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> <li>- For non-PUSCH hopping with resource allocation type 1: <ul style="list-style-type: none"> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> </ul> </li> <li>- Time domain resource assignment – 4 bits as defined in Subclause 6.1.2.1 of [6, TS 38.214]</li> <li>- Frequency hopping flag – 1 bit according to Table 7.3.1.1.1-3, as defined in Subclause 6.3 of [6, TS 38.214]</li> <li>- Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</li> <li>- New data indicator – 1 bit</li> <li>- Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2</li> <li>- HARQ process number – 4 bits</li> <li>- TPC command for scheduled PUSCH – 2 bits as defined in Subclause 7.1.1 of [5, TS 38.213]</li> <li>- Padding bits, if required.</li> <li>- UL/SUL indicator – 1 bit for UEs configured with <i>supplementaryUplink</i> in <i>ServingCellConfig</i> in the cell as defined in Table 7.3.1.1.1-1 and the number of bits for DCI format 1_0 before padding is larger than the number of bits for DCI format 0_0 before padding; 0 bit otherwise. The UL/SUL indicator, if present, locates in the last bit position of DCI format 0_0, after the padding bit(s). <ul style="list-style-type: none"> <li>- If the UL/SUL indicator is present in DCI format 0_0 and the higher layer parameter <i>pusch-Config</i> is not configured on both UL and SUL the UE ignores the UL/SUL indicator field in DCI format 0_0, and the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured;</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured.</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is not configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the uplink on which the latest PRACH is transmitted.</li> </ul> </li> </ul> |

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| U.S. Patent No.<br>10,869,247                           | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
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|                                                         | <div>7.3.1.1.2            Format 0_1</div> <div>DCI format 0_1 is used for the scheduling of PUSCH in one cell.</div> <div>3GPP TS 38.212 v15.8.0 at 76-78.</div> <div><div>4.4            Functions</div><div>The MAC sublayer supports the following functions:</div><div><ul style="list-style-type: none"><li>• mapping between logical channels and transport channels;</li><li>• multiplexing of MAC SDUs from one or different logical channels onto transport blocks (TB) to be delivered to the physical layer on transport channels;</li><li>• demultiplexing of MAC SDUs to one or different logical channels from transport blocks (TB) delivered from the physical layer on transport channels;</li><li>• scheduling information reporting;</li><li>• error correction through HARQ;</li><li>• logical channel prioritisation.</li></ul></div><div>The relevance of MAC functions for uplink and downlink is indicated in Table 4.4-1.</div><div><div>Table 4.4-1: The link direction association of MAC functions.</div><table><tr><th>MAC function</th><th>Downlink</th><th>Uplink</th></tr><tr><td>Mapping between logical channels and transport channels</td><td>X</td><td>X</td></tr><tr><td>Multiplexing</td><td></td><td>X</td></tr><tr><td>Demultiplexing</td><td>X</td><td></td></tr><tr><td>Scheduling information reporting</td><td></td><td>X</td></tr><tr><td>Error correction through HARQ</td><td>X</td><td>X</td></tr><tr><td>Logical Channel prioritisation</td><td></td><td>X</td></tr></table></div><div>3GPP TS 38.321 v15.8.0 at 11.</div></div> | MAC function | Downlink | Uplink | Mapping between logical channels and transport channels | X | X | Multiplexing |  | X | Demultiplexing | X |  | Scheduling information reporting |  | X | Error correction through HARQ | X | X | Logical Channel prioritisation |  | X |
| MAC function                                            | Downlink                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Uplink       |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Mapping between logical channels and transport channels | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Multiplexing                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Demultiplexing                                          | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Scheduling information reporting                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Error correction through HARQ                           | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Logical Channel prioritisation                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                                                                                             | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>[1.f] wherein the uplink scheduling information includes a H-ARQ process identification for the H-ARQ process; and</p> | <p>Each of the Accused LGE '247 Products is a user equipment that would have a wireless transmit/receive unit to receive uplink scheduling information from the base station that includes a H-ARQ process identification for the H-ARQ process.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a processor and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and supports a wireless transmit/receive unit to receive uplink scheduling information from the base station that includes a H-ARQ process identification for the H-ARQ process.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> <p><b>5.4.1 UL Grant reception</b></p> <p>Uplink grant is either received dynamically on the PDCCH, in a Random Access Response, or configured semi-persistently by RRC. The MAC entity shall have an uplink grant to transmit on the UL-SCH. To perform the requested transmissions, the MAC layer receives HARQ information from lower layers.</p> <p>TS 38.321 v15.8.0 at 27</p> <p><b>3.1 Definitions</b></p> <p>For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].</p> <p><b>HARQ information:</b> HARQ information for DL-SCH or for UL-SCH transmissions consists of New Data Indicator (NDI), Transport Block size (TBS), Redundancy Version (RV), and HARQ process ID.</p> <p>3GPP TS 38.321 v15.8.0 at 8.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               | <p><b>5.4.2 HARQ operation</b></p> <p><b>5.4.2.1 HARQ Entity</b></p> <p>The MAC entity includes a HARQ entity for each Serving Cell with configured uplink (including the case when it is configured with <i>supplementaryUplink</i>), which maintains a number of parallel HARQ processes.</p> <p>The number of parallel UL HARQ processes per HARQ entity is specified in TS 38.214 [7].</p> <p>Each HARQ process supports one TB.</p> <p>Each HARQ process is associated with a HARQ process identifier. For UL transmission with UL grant in RA Response, HARQ process identifier 0 is used.</p> <p>3GPP TS 38.321 v15.8.0 at 28.</p> <p>For each Serving Cell and each configured uplink grant, if configured and activated, the MAC entity shall:</p> <ul style="list-style-type: none"> <li>1&gt; if the PUSCH duration of the configured uplink grant does not overlap with the PUSCH duration of an uplink grant received on the PDCCH or in a Random Access Response for this Serving Cell:</li> <li>2&gt; set the HARQ Process ID to the HARQ Process ID associated with this PUSCH duration;</li> <li>2&gt; if the <i>configuredGrantTimer</i> for the corresponding HARQ process is not running:</li> <li>3&gt; consider the NDI bit for the corresponding HARQ process to have been toggled;</li> <li>3&gt; deliver the configured uplink grant and the associated HARQ information to the HARQ entity.</li> </ul> <p>For configured uplink grants, the HARQ Process ID associated with the first symbol of a UL transmission is derived from the following equation:</p> $\text{HARQ Process ID} = [\text{floor}(\text{CURRENT\_symbol} / \text{periodicity})] \bmod n_{\text{rofHARQ-Processes}}$ <p>where <math>\text{CURRENT\_symbol} = (\text{SFN} \times \text{numberOfSlotsPerFrame} \times \text{numberOfSymbolsPerSlot} + \text{slot number in the frame} \times \text{numberOfSymbolsPerSlot} + \text{symbol number in the slot})</math>, and <i>numberOfSlotsPerFrame</i> and <i>numberOfSymbolsPerSlot</i> refer to the number of consecutive slots per frame and the number of consecutive symbols per slot, respectively as specified in TS 38.211 [8].</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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|                               | <p>3GPP TS 38.321 v15.8.0 at 27-28.</p> <p>&lt;3GPP TS 38.212 v15.8.0 &gt;</p> <p><b>7.3 Downlink control information</b></p> <p>A DCI transports downlink control information for one or more cells with one RNTI.</p> <p>The following coding steps can be identified:</p> <ul style="list-style-type: none"><li>- Information element multiplexing</li><li>- CRC attachment</li><li>- Channel coding</li><li>- Rate matching</li></ul> <p>3GPP TS 38.212 v15.8.0 at 74.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
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|                               | <p data-bbox="499 310 844 345"><b>7.3.1 DCI formats</b></p> <p data-bbox="499 371 1083 401">The DCI formats defined in table 7.3.1-1 are supported.</p> <p data-bbox="968 435 1289 459" style="text-align: center;"><b>Table 7.3.1-1: DCI formats</b></p> <table data-bbox="642 485 1614 854"> <tr> <th data-bbox="642 485 963 542">DCI format</th><th data-bbox="963 485 1614 542">Usage</th></tr> <tr> <td data-bbox="642 542 963 571">0_0</td><td data-bbox="963 542 1614 571">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 571 963 600">0_1</td><td data-bbox="963 571 1614 600">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 600 963 630">1_0</td><td data-bbox="963 600 1614 630">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 630 963 659">1_1</td><td data-bbox="963 630 1614 659">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 659 963 688">2_0</td><td data-bbox="963 659 1614 688">Notifying a group of UEs of the slot format</td></tr> <tr> <td data-bbox="642 688 963 769">2_1</td><td data-bbox="963 688 1614 769">Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE</td></tr> <tr> <td data-bbox="642 769 963 799">2_2</td><td data-bbox="963 769 1614 799">Transmission of TPC commands for PUCCH and PUSCH</td></tr> <tr> <td data-bbox="642 799 963 854">2_3</td><td data-bbox="963 799 1614 854">Transmission of a group of TPC commands for SRS transmissions by one or more UEs</td></tr> </table> <p data-bbox="457 917 858 946">3GPP TS 38.212 v15.8.0 at 74.</p> | DCI format | Usage | 0_0 | Scheduling of PUSCH in one cell | 0_1 | Scheduling of PUSCH in one cell | 1_0 | Scheduling of PDSCH in one cell | 1_1 | Scheduling of PDSCH in one cell | 2_0 | Notifying a group of UEs of the slot format | 2_1 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | 2_2 | Transmission of TPC commands for PUCCH and PUSCH | 2_3 | Transmission of a group of TPC commands for SRS transmissions by one or more UEs |
| DCI format                    | Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_0                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_1                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_0                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_1                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_0                           | Notifying a group of UEs of the slot format                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_1                           | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_2                           | Transmission of TPC commands for PUCCH and PUSCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_3                           | Transmission of a group of TPC commands for SRS transmissions by one or more UEs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|                               | <p>7.3.1.1 DCI formats for scheduling of PUSCH</p> <p>7.3.1.1.1 Format 0_0</p> <p>DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <p>The following information is transmitted by means of the DCI format 0_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:</p> <ul style="list-style-type: none"> <li>- Identifier for DCI formats – 1 bit</li> <li>- The value of this bit field is always set to 0, indicating an UL DCI format</li> <li>- Frequency domain resource assignment – <math>\lceil \log_2(N_{RB}^{UL,BWP}(N_{RB}^{UL,BWP} + 1)/2) \rceil</math> bits where <math>N_{RB}^{UL,BWP}</math> is defined in subclause 7.3.1.0</li> <li>- For PUSCH hopping with resource allocation type 1:</li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               | <ul style="list-style-type: none"> <li>- <math>N_{UL\_hop}</math> MSB bits are used to indicate the frequency offset according to Subclause 6.3 of [6, TS 38.214], where <math>N_{UL\_hop} = 1</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains two offset values and <math>N_{UL\_hop} = 2</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains four offset values</li> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil - N_{UL\_hop}</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> <li>- For non-PUSCH hopping with resource allocation type 1: <ul style="list-style-type: none"> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> </ul> </li> <li>- Time domain resource assignment – 4 bits as defined in Subclause 6.1.2.1 of [6, TS 38.214]</li> <li>- Frequency hopping flag – 1 bit according to Table 7.3.1.1.1-3, as defined in Subclause 6.3 of [6, TS 38.214]</li> <li>- Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</li> <li>- New data indicator – 1 bit</li> <li>- Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2</li> <li>- HARQ process number – 4 bits</li> <li>- TPC command for scheduled PUSCH – 2 bits as defined in Subclause 7.1.1 of [5, TS 38.213]</li> <li>- Padding bits, if required.</li> <li>- UL/SUL indicator – 1 bit for UEs configured with <i>supplementaryUplink</i> in <i>ServingCellConfig</i> in the cell as defined in Table 7.3.1.1.1-1 and the number of bits for DCI format 1_0 before padding is larger than the number of bits for DCI format 0_0 before padding; 0 bit otherwise. The UL/SUL indicator, if present, locates in the last bit position of DCI format 0_0, after the padding bit(s). <ul style="list-style-type: none"> <li>- If the UL/SUL indicator is present in DCI format 0_0 and the higher layer parameter <i>pusch-Config</i> is not configured on both UL and SUL the UE ignores the UL/SUL indicator field in DCI format 0_0, and the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured;</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured.</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is not configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the uplink on which the latest PRACH is transmitted.</li> </ul> </li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                           | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
|---------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|--------|---------------------------------------------------------|---|---|--------------|--|---|----------------|---|--|----------------------------------|--|---|-------------------------------|---|---|--------------------------------|--|---|
|                                                         | <div>7.3.1.1.2            Format 0_1</div> <div>DCI format 0_1 is used for the scheduling of PUSCH in one cell.</div> <div>3GPP TS 38.212 v15.8.0 at 76-78.</div> <div>4.4            Functions</div> <div>The MAC sublayer supports the following functions:</div> <div><ul style="list-style-type: none"><li>- mapping between logical channels and transport channels;</li><li>- multiplexing of MAC SDUs from one or different logical channels onto transport blocks (TB) to be delivered to the physical layer on transport channels;</li><li>- demultiplexing of MAC SDUs to one or different logical channels from transport blocks (TB) delivered from the physical layer on transport channels;</li><li>- scheduling information reporting;</li><li>- error correction through HARQ;</li><li>- logical channel prioritisation.</li></ul></div> <div>The relevance of MAC functions for uplink and downlink is indicated in Table 4.4-1.</div> <div>Table 4.4-1: The link direction association of MAC functions.</div> <table><tr><th>MAC function</th><th>Downlink</th><th>Uplink</th></tr><tr><td>Mapping between logical channels and transport channels</td><td>X</td><td>X</td></tr><tr><td>Multiplexing</td><td></td><td>X</td></tr><tr><td>Demultiplexing</td><td>X</td><td></td></tr><tr><td>Scheduling information reporting</td><td></td><td>X</td></tr><tr><td>Error correction through HARQ</td><td>X</td><td>X</td></tr><tr><td>Logical Channel prioritisation</td><td></td><td>X</td></tr></table> <div>3GPP TS 38.321 v15.8.0 at 11.</div> | MAC function | Downlink | Uplink | Mapping between logical channels and transport channels | X | X | Multiplexing |  | X | Demultiplexing | X |  | Scheduling information reporting |  | X | Error correction through HARQ | X | X | Logical Channel prioritisation |  | X |
| MAC function                                            | Downlink                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Uplink       |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Mapping between logical channels and transport channels | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Multiplexing                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Demultiplexing                                          | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Scheduling information reporting                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Error correction through HARQ                           | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Logical Channel prioritisation                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| [1.g] determine                                         | Each of the Accused LGE '247 Products is a user equipment that would determine whether to retransmit the data block based on the received uplink scheduling information and not based on whether the WTRU has received a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |              |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |

**APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247**

| <b>U.S. Patent No.<br/>10,869,247</b>                                                                                                                                                                   | <b>Exemplary Evidence of Infringement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
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| <p>whether to retransmit the data block based on the received uplink scheduling information and not based on whether the WTRU has received a negative acknowledgement (NACK) from the base station.</p> | <p>negative acknowledgement (NACK) from the base station.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a processor and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and supports determining whether to retransmit the data block based on the received uplink scheduling information and not based on whether the WTRU has received a negative acknowledgement (NACK) from the base station.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                               | <p><b>5.4 UL-SCH data transfer</b></p> <p><b>5.4.1 UL Grant reception</b></p> <p>Uplink grant is either received dynamically on the PDCCH, in a Random Access Response, or configured semi-persistently by RRC. The MAC entity shall have an uplink grant to transmit on the UL-SCH. To perform the requested transmissions, the MAC layer receives HARQ information from lower layers.</p> <p>If the MAC entity has a C-RNTI, a Temporary C-RNTI, or CS-RNTI, the MAC entity shall for each PDCCH occasion and for each Serving Cell belonging to a TAG that has a running <i>timeAlignmentTimer</i> and for each grant received for this PDCCH occasion:</p> <ul style="list-style-type: none"> <li>1&gt; if an uplink grant for this Serving Cell has been received on the PDCCH for the MAC entity's C-RNTI or Temporary C-RNTI; or</li> <li>1&gt; if an uplink grant has been received in a Random Access Response: <ul style="list-style-type: none"> <li>2&gt; if the uplink grant is for MAC entity's C-RNTI and if the previous uplink grant delivered to the HARQ entity for the same HARQ process was either an uplink grant received for the MAC entity's CS-RNTI or a configured uplink grant: <ul style="list-style-type: none"> <li>3&gt; consider the NDI to have been toggled for the corresponding HARQ process regardless of the value of the NDI.</li> </ul> </li> <li>2&gt; if the uplink grant is for MAC entity's C-RNTI, and the identified HARQ process is configured for a configured uplink grant: <ul style="list-style-type: none"> <li>3&gt; start or restart the <i>configuredGrantTimer</i> for the corresponding HARQ process, if configured.</li> </ul> </li> <li>2&gt; deliver the uplink grant and the associated HARQ information to the HARQ entity.</li> </ul> </li> </ul> <p>3GPP TS 38.321 v15.8.0 at 27.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
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|                               | <p data-bbox="457 305 814 332">&lt;3GPP TS 38.212 v15.8.0&gt;</p> <p data-bbox="499 414 844 451"><b>7.3.1 DCI formats</b></p> <p data-bbox="499 479 1081 506">The DCI formats defined in table 7.3.1-1 are supported.</p> <p data-bbox="968 540 1289 568"><b>Table 7.3.1-1: DCI formats</b></p> <table data-bbox="642 591 1614 958"> <tr> <th data-bbox="642 591 963 646">DCI format</th><th data-bbox="963 591 1614 646">Usage</th></tr> <tr> <td data-bbox="642 646 963 673">0_0</td><td data-bbox="963 646 1614 673">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 673 963 701">0_1</td><td data-bbox="963 673 1614 701">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 701 963 729">1_0</td><td data-bbox="963 701 1614 729">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 729 963 756">1_1</td><td data-bbox="963 729 1614 756">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 756 963 784">2_0</td><td data-bbox="963 756 1614 784">Notifying a group of UEs of the slot format</td></tr> <tr> <td data-bbox="642 784 963 873">2_1</td><td data-bbox="963 784 1614 873">Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE</td></tr> <tr> <td data-bbox="642 873 963 901">2_2</td><td data-bbox="963 873 1614 901">Transmission of TPC commands for PUCCH and PUSCH</td></tr> <tr> <td data-bbox="642 901 963 958">2_3</td><td data-bbox="963 901 1614 958">Transmission of a group of TPC commands for SRS transmissions by one or more UEs</td></tr> </table> <p data-bbox="457 1023 856 1050">3GPP TS 38.212 v15.8.0 at 74.</p> | DCI format | Usage | 0_0 | Scheduling of PUSCH in one cell | 0_1 | Scheduling of PUSCH in one cell | 1_0 | Scheduling of PDSCH in one cell | 1_1 | Scheduling of PDSCH in one cell | 2_0 | Notifying a group of UEs of the slot format | 2_1 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | 2_2 | Transmission of TPC commands for PUCCH and PUSCH | 2_3 | Transmission of a group of TPC commands for SRS transmissions by one or more UEs |
| DCI format                    | Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_0                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_1                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_0                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_1                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_0                           | Notifying a group of UEs of the slot format                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_1                           | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_2                           | Transmission of TPC commands for PUCCH and PUSCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_3                           | Transmission of a group of TPC commands for SRS transmissions by one or more UEs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|                               | <p data-bbox="470 313 1192 349">7.3.1.1 DCI formats for scheduling of PUSCH</p> <p data-bbox="470 386 848 422">7.3.1.1.1 Format 0_0</p> <p data-bbox="470 448 1163 483">DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <p data-bbox="470 503 1692 561">The following information is transmitted by means of the DCI format 0_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:</p> <ul style="list-style-type: none"> <li data-bbox="506 587 898 623">- Identifier for DCI formats – 1 bit</li> <li data-bbox="548 643 1367 678">- The value of this bit field is always set to 0, indicating an UL DCI format</li> <li data-bbox="506 698 1703 776">- Frequency domain resource assignment – <math>\left\lceil \log_2(N_{RB}^{UL,BWP}(N_{RB}^{UL,BWP} + 1)/2) \right\rceil</math> bits where <math>N_{RB}^{UL,BWP}</math> is defined in subclause 7.3.1.0</li> <li data-bbox="548 795 1150 831">- For PUSCH hopping with resource allocation type 1:</li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                               | <ul style="list-style-type: none"> <li>- <math>N_{UL\_hop}</math> MSB bits are used to indicate the frequency offset according to Subclause 6.3 of [6, TS 38.214], where <math>N_{UL\_hop} = 1</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains two offset values and <math>N_{UL\_hop} = 2</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains four offset values</li> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil - N_{UL\_hop}</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> <li>- For non-PUSCH hopping with resource allocation type 1: <ul style="list-style-type: none"> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> </ul> </li> <li>- Time domain resource assignment – 4 bits as defined in Subclause 6.1.2.1 of [6, TS 38.214]</li> <li>- Frequency hopping flag – 1 bit according to Table 7.3.1.1.1-3, as defined in Subclause 6.3 of [6, TS 38.214]</li> <li>- Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</li> <li>- New data indicator – 1 bit</li> <li>- Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2</li> <li>- HARQ process number – 4 bits</li> <li>- TPC command for scheduled PUSCH – 2 bits as defined in Subclause 7.1.1 of [5, TS 38.213]</li> <li>- Padding bits, if required.</li> <li>- UL/SUL indicator – 1 bit for UEs configured with <i>supplementaryUplink</i> in <i>ServingCellConfig</i> in the cell as defined in Table 7.3.1.1.1-1 and the number of bits for DCI format 1_0 before padding is larger than the number of bits for DCI format 0_0 before padding; 0 bit otherwise. The UL/SUL indicator, if present, locates in the last bit position of DCI format 0_0, after the padding bit(s). <ul style="list-style-type: none"> <li>- If the UL/SUL indicator is present in DCI format 0_0 and the higher layer parameter <i>pusch-Config</i> is not configured on both UL and SUL the UE ignores the UL/SUL indicator field in DCI format 0_0, and the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured;</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured.</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is not configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the uplink on which the latest PRACH is transmitted.</li> </ul> </li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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|                               | <p data-bbox="510 313 884 345"><b>7.3.1.1.2      Format 0_1</b></p> <p data-bbox="510 370 1203 402">DCI format 0_1 is used for the scheduling of PUSCH in one cell.</p> <p data-bbox="459 459 900 492">3GPP TS 38.212 v15.8.0 at 76-78.</p> <p data-bbox="497 578 869 610"><b>5.4.2      HARQ operation</b></p> <p data-bbox="497 651 821 683"><b>5.4.2.1      HARQ Entity</b></p> <p data-bbox="497 708 1583 756">The MAC entity includes a HARQ entity for each Serving Cell with configured uplink (including the case when it is configured with <i>supplementaryUplink</i>), which maintains a number of parallel HARQ processes.</p> <p data-bbox="497 781 1356 813">The number of parallel UL HARQ processes per HARQ entity is specified in TS 38.214 [7].</p> <p data-bbox="497 829 856 862">Each HARQ process supports one TB.</p> <p data-bbox="497 878 1520 927">Each HARQ process is associated with a HARQ process identifier. For UL transmission with UL grant in RA Response, HARQ process identifier 0 is used.</p> <p data-bbox="497 951 1608 1219">When the MAC entity is configured with <i>pusch-AggregationFactor</i> &gt; 1, the parameter <i>pusch-AggregationFactor</i> provides the number of transmissions of a TB within a bundle of the dynamic grant. After the initial transmission, <i>pusch-AggregationFactor</i> – 1 HARQ retransmissions follow within a bundle. When the MAC entity is configured with <i>repK</i> &gt; 1, the parameter <i>repK</i> provides the number of transmissions of a TB within a bundle of the configured uplink grant. After the initial transmission, HARQ retransmissions follow within a bundle. For both dynamic grant and configured uplink grant, bundling operation relies on the HARQ entity for invoking the same HARQ process for each transmission that is part of the same bundle. Within a bundle, HARQ retransmissions are triggered without waiting for feedback from previous transmission according to <i>pusch-AggregationFactor</i> for a dynamic grant and <i>repK</i> for a configured uplink grant, respectively. Each transmission within a bundle is a separate uplink grant after the initial uplink grant within a bundle is delivered to the HARQ entity.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                               | <p>For each uplink grant, the HARQ entity shall:</p> <ul style="list-style-type: none"> <li>1&gt; identify the HARQ process associated with this grant, and for each identified HARQ process: <ul style="list-style-type: none"> <li>2&gt; if the received grant was not addressed to a Temporary C-RNTI on PDCCH, and the NDI provided in the associated HARQ information has been toggled compared to the value in the previous transmission of this TB of this HARQ process; or</li> </ul> </li> <li>2&gt; if the uplink grant was received on PDCCH for the C-RNTI and the HARQ buffer of the identified process is empty; or</li> <li>2&gt; if the uplink grant was received in a Random Access Response; or</li> <li>2&gt; if the uplink grant was received on PDCCH for the C-RNTI in <i>ra-ResponseWindow</i> and this PDCCH successfully completed the Random Access procedure initiated for beam failure recovery; or</li> <li>2&gt; if the uplink grant is part of a bundle of the configured uplink grant, and may be used for initial transmission according to clause 6.1.2.3 of TS 38.214 [7], and if no MAC PDU has been obtained for this bundle: <ul style="list-style-type: none"> <li>3&gt; if there is a MAC PDU in the Msg3 buffer and the uplink grant was received in a Random Access Response; or:</li> <li>3&gt; if there is a MAC PDU in the Msg3 buffer and the uplink grant was received on PDCCH for the C-RNTI in <i>ra-ResponseWindow</i> and this PDCCH successfully completed the Random Access procedure initiated for beam failure recovery;</li> </ul> </li> <li>4&gt; obtain the MAC PDU to transmit from the Msg3 buffer.</li> <li>4&gt; if the uplink grant size does not match with size of the obtained MAC PDU; and</li> <li>4&gt; if the Random Access procedure was successfully completed upon receiving the uplink grant: <ul style="list-style-type: none"> <li>5&gt; indicate to the Multiplexing and assembly entity to include MAC subPDU(s) carrying MAC SDU from the obtained MAC PDU in the subsequent uplink transmission;</li> <li>5&gt; obtain the MAC PDU to transmit from the Multiplexing and assembly entity.</li> </ul> </li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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|                               | <p>3&gt; else:</p> <p>4&gt; obtain the MAC PDU to transmit from the Multiplexing and assembly entity, if any;</p> <p>3&gt; if a MAC PDU to transmit has been obtained:</p> <p>4&gt; deliver the MAC PDU and the uplink grant and the HARQ information of the TB to the identified HARQ process;</p> <p>4&gt; instruct the identified HARQ process to trigger a new transmission;</p> <p>4&gt; if the uplink grant is addressed to CS-RNTI; or</p> <p>4&gt; if the uplink grant is a configured uplink grant; or</p> <p>4&gt; if the uplink grant is addressed to C-RNTI, and the identified HARQ process is configured for a configured uplink grant:</p> <p>5&gt; start or restart the <i>configuredGrantTimer</i>, if configured, for the corresponding HARQ process when the transmission is performed.</p> <p>3&gt; else:</p> <p>4&gt; flush the HARQ buffer of the identified HARQ process.</p> <p>2&gt; else (i.e. retransmission):</p> <p>3&gt; if the uplink grant received on PDCCH was addressed to CS-RNTI and if the HARQ buffer of the identified process is empty; or</p> <p>3&gt; if the uplink grant is part of a bundle and if no MAC PDU has been obtained for this bundle; or</p> <p>3&gt; if the uplink grant is part of a bundle of the configured uplink grant, and the PUSCH duration of the uplink grant overlaps with a PUSCH duration of another uplink grant received on the PDCCH or in a Random Access Response for this Serving Cell:</p> <p>4&gt; ignore the uplink grant.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                                                                                                                                                                     | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
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|                                                                                                                                                                                                   | <pre> 3&gt; else:     4&gt; deliver the uplink grant and the HARQ information (redundancy version) of the TB to the identified         HARQ process;     4&gt; instruct the identified HARQ process to trigger a retransmission;     4&gt; if the uplink grant is addressed to CS-RNTI; or     4&gt; if the uplink grant is addressed to C-RNTI, and the identified HARQ process is configured for a         configured uplink grant:         5&gt; start or restart the <i>configuredGrantTimer</i>, if configured, for the corresponding HARQ process             when the transmission is performed. </pre> <p>3GPP TS 38.321 v15.8.0 at 28-30.</p>                                                                                                                                          |
| [2.pre] The WTRU of claim 1,                                                                                                                                                                      | See claim 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| [2.a] wherein the at least one transceiver and the processor are further configured to cause the WTRU to, in response to a determination to retransmit the data block, retransmit the data block. | <p>Each of the Accused LGE '247 Products is a user equipment would have at least one transceiver and the processor that are further configured to cause the WTRU to, in response to a determination to retransmit the data block, retransmit the data block.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a processor and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and is configured to cause the WTRU to, in response to a determination to retransmit the data block, retransmit the data block.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                               | <p data-bbox="462 305 814 332">&lt;3GPP TS 38.321 v15.8.0&gt;</p> <p data-bbox="520 427 957 467"><b>5.4.2 HARQ operation</b></p> <p data-bbox="520 509 898 550"><b>5.4.2.1 HARQ entity</b></p> <p data-bbox="478 592 785 620">2&gt; else (i.e. retransmission):</p> <p data-bbox="520 646 1596 703">3&gt; if the uplink grant received on PDCCH was addressed to CS-RNTI and if the HARQ buffer of the identified process is empty; or</p> <p data-bbox="520 729 1566 756">3&gt; if the uplink grant is part of a bundle and if no MAC PDU has been obtained for this bundle; or</p> <p data-bbox="520 782 1629 873">3&gt; if the uplink grant is part of a bundle of the configured uplink grant, and the PUSCH duration of the uplink grant overlaps with a PUSCH duration of another uplink grant received on the PDCCH or in a Random Access Response for this Serving Cell:</p> <p data-bbox="554 899 842 927">4&gt; ignore the uplink grant.</p> <p data-bbox="531 995 611 1023">3&gt; else:</p> <p data-bbox="564 1049 1562 1105">4&gt; deliver the uplink grant and the HARQ information (redundancy version) of the TB to the identified HARQ process;</p> <p data-bbox="564 1131 1222 1159">4&gt; instruct the identified HARQ process to trigger a retransmission;</p> <p data-bbox="564 1183 1054 1211">4&gt; if the uplink grant is addressed to CS-RNTI; or</p> <p data-bbox="564 1237 1520 1294">4&gt; if the uplink grant is addressed to C-RNTI, and the identified HARQ process is configured for a configured uplink grant:</p> <p data-bbox="598 1320 1535 1377">5&gt; start or restart the <i>configuredGrantTimer</i>, if configured, for the corresponding HARQ process when the transmission is performed.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|                               | <p>3GPP TS 38.321 v15.8.0 at 28-30.</p> <p><b>5.4.2.2 HARQ process</b></p> <p>Each HARQ process is associated with a HARQ buffer.</p> <p>New transmissions are performed on the resource and with the MCS indicated on either PDCCH, Random Access Response, or RRC. Retransmissions are performed on the resource and, if provided, with the MCS indicated on PDCCH, or on the same resource and with the same MCS as was used for last made transmission attempt within a bundle.</p> <p>If the HARQ entity requests a new transmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; store the MAC PDU in the associated HARQ buffer;</li> <li>1&gt; store the uplink grant received from the HARQ entity;</li> <li>1&gt; generate a transmission as described below.</li> </ul> <p>If the HARQ entity requests a retransmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; store the uplink grant received from the HARQ entity;</li> <li>1&gt; generate a transmission as described below.</li> </ul> <p>To generate a transmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; if the MAC PDU was obtained from the Msg3 buffer; or</li> <li>1&gt; if there is no measurement gap at the time of the transmission and, in case of retransmission, the retransmission does not collide with a transmission for a MAC PDU obtained from the Msg3 buffer:</li> <li>2&gt; instruct the physical layer to generate a transmission according to the stored uplink grant.</li> </ul> <p>3GPP TS 38.321 v15.8.0 at 30.</p> |
| [8.pre] The WTRU of claim 1,  | See claim 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| [8.a] wherein the             | Each of the Accused LGE '247 Products is a user equipment configured to receive scheduling information that indicates a modulation and coding scheme.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                                    | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| scheduling information indicates a modulation and coding scheme. | <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a processor and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and is configured to receive scheduling information that indicates a modulation and coding scheme.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> <p><b>5.4.1 UL Grant reception</b></p> <p>Uplink grant is either received dynamically on the PDCCH, in a Random Access Response, or configured semi-persistently by RRC. The MAC entity shall have an uplink grant to transmit on the UL-SCH. To perform the requested transmissions, the MAC layer receives HARQ information from lower layers.</p> <p>3GPP TS 38.321 v15.8.0 at 27.</p> <p><b>5.4.2.1 HARQ Entity</b></p> <p>The MAC entity includes a HARQ entity for each Serving Cell with configured uplink (including the case when it is configured with <i>supplementaryUplink</i>), which maintains a number of parallel HARQ processes.</p> <p>The number of parallel UL HARQ processes per HARQ entity is specified in TS 38.214 [7].</p> <p>Each HARQ process supports one TB.</p> <p>Each HARQ process is associated with a HARQ process identifier. For UL transmission with UL grant in RA Response, HARQ process identifier 0 is used.</p> <p>3GPP TS 38.321 v15.8.0 at 28.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|                               | <p><b>5.4.2.2 HARQ process</b></p> <p>Each HARQ process is associated with a HARQ buffer.</p> <p>New transmissions are performed on the resource and with the MCS indicated on either PDCCH, Random Access Response, or RRC. Retransmissions are performed on the resource and, if provided, with the MCS indicated on PDCCH, or on the same resource and with the same MCS as was used for last made transmission attempt within a bundle.</p> <p>3GPP TS 38.321 v15.8.0 at 30.</p> <p>&lt;3GPP TS 38.212 v15.8.0&gt;</p><br><p><b>7.3.1.1 DCI formats for scheduling of PUSCH</b></p><br><p><b>7.3.1.1.1 Format 0_0</b></p> <p>DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <p>3GPP TS 38.212 v15.8.0 at 76.</p><br><p><b>7.3.1.1.2 Format 0_1</b></p> <p>DCI format 0_1 is used for the scheduling of PUSCH in one cell.</p> <p>3GPP TS 38.212 v15.8.0 at 78.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
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|                               | <p data-bbox="499 305 844 342"><b>7.3.1 DCI formats</b></p> <p data-bbox="499 370 1083 399">The DCI formats defined in table 7.3.1-1 are supported.</p> <p data-bbox="968 431 1289 456" style="text-align: center;"><b>Table 7.3.1-1: DCI formats</b></p> <table data-bbox="642 483 1612 852"> <tr> <th data-bbox="642 483 963 540">DCI format</th><th data-bbox="963 483 1612 540">Usage</th></tr> <tr> <td data-bbox="642 540 963 570">0_0</td><td data-bbox="963 540 1612 570">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 570 963 599">0_1</td><td data-bbox="963 570 1612 599">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 599 963 628">1_0</td><td data-bbox="963 599 1612 628">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 628 963 657">1_1</td><td data-bbox="963 628 1612 657">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 657 963 686">2_0</td><td data-bbox="963 657 1612 686">Notifying a group of UEs of the slot format</td></tr> <tr> <td data-bbox="642 686 963 768">2_1</td><td data-bbox="963 686 1612 768">Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE</td></tr> <tr> <td data-bbox="642 768 963 797">2_2</td><td data-bbox="963 768 1612 797">Transmission of TPC commands for PUCCH and PUSCH</td></tr> <tr> <td data-bbox="642 797 963 852">2_3</td><td data-bbox="963 797 1612 852">Transmission of a group of TPC commands for SRS transmissions by one or more UEs</td></tr> </table> <p data-bbox="457 914 858 943">3GPP TS 38.212 v15.8.0 at 74.</p> <p data-bbox="489 984 865 1019"><b>7.3.1.1.1 Format 0_0</b></p> <p data-bbox="489 1044 1182 1073">DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <ul data-bbox="474 1122 1509 1151" style="list-style-type: none"> <li>- Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</li> </ul> <p data-bbox="457 1192 900 1221">3GPP TS 38.212 v15.8.0 at 76-77.</p> <p data-bbox="468 1261 844 1297"><b>7.3.1.1.2 Format 0_1</b></p> <p data-bbox="468 1321 1163 1351">DCI format 0_1 is used for the scheduling of PUSCH in one cell.</p> | DCI format | Usage | 0_0 | Scheduling of PUSCH in one cell | 0_1 | Scheduling of PUSCH in one cell | 1_0 | Scheduling of PDSCH in one cell | 1_1 | Scheduling of PDSCH in one cell | 2_0 | Notifying a group of UEs of the slot format | 2_1 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | 2_2 | Transmission of TPC commands for PUCCH and PUSCH | 2_3 | Transmission of a group of TPC commands for SRS transmissions by one or more UEs |
| DCI format                    | Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_0                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_1                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_0                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_1                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_0                           | Notifying a group of UEs of the slot format                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_1                           | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_2                           | Transmission of TPC commands for PUCCH and PUSCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_3                           | Transmission of a group of TPC commands for SRS transmissions by one or more UEs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                                                                                                                               | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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|                                                                                                                                                             | <p>- Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</p> <p>3GPP TS 38.212 v15.8.0 at 78-80.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| [11.pre] A method compromising:                                                                                                                             | Each of the Accused LGE '247 Products is a user equipment configured to perform the method steps below.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| [11.a]<br>transmitting, by a wireless transmit/receive unit (WTRU), a data block to a base station using a hybrid automatic repeat request (H-ARQ) process; | <p>Each of the Accused LGE '247 Products is a user equipment that would have a wireless transmit/receive unit to transmit a data block to a base station using a hybrid automatic repeat request (H-ARQ) process.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a chipset, antenna or antennas, memory, and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and has a wireless transmit/receive unit to transmit a data block to a base station using a hybrid automatic repeat request (H-ARQ) process.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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|                               | <p><b>5.4.2 HARQ operation</b></p> <p><b>5.4.2.1 HARQ Entity</b></p> <p>The MAC entity includes a HARQ entity for each Serving Cell with configured uplink (including the case when it is configured with <i>supplementaryUplink</i>), which maintains a number of parallel HARQ processes.</p> <p>The number of parallel UL HARQ processes per HARQ entity is specified in TS 38.214 [7].</p> <p>Each HARQ process supports one TB.</p> <p>Each HARQ process is associated with a HARQ process identifier. For UL transmission with UL grant in RA Response, HARQ process identifier 0 is used.</p> <p>When the MAC entity is configured with <i>pusch-AggregationFactor</i> &gt; 1, the parameter <i>pusch-AggregationFactor</i> provides the number of transmissions of a TB within a bundle of the dynamic grant. After the initial transmission, <i>pusch-AggregationFactor</i> – 1 HARQ retransmissions follow within a bundle. When the MAC entity is configured with <i>repK</i> &gt; 1, the parameter <i>repK</i> provides the number of transmissions of a TB within a bundle of the configured uplink grant. After the initial transmission, HARQ retransmissions follow within a bundle. For both dynamic grant and configured uplink grant, bundling operation relies on the HARQ entity for invoking the same HARQ process for each transmission that is part of the same bundle. Within a bundle, HARQ retransmissions are triggered without waiting for feedback from previous transmission according to <i>pusch-AggregationFactor</i> for a dynamic grant and <i>repK</i> for a configured uplink grant, respectively. Each transmission within a bundle is a separate uplink grant after the initial uplink grant within a bundle is delivered to the HARQ entity.</p> <p>For each transmission within a bundle of the dynamic grant, the sequence of redundancy versions is determined according to clause 6.1.2.1 of TS 38.214 [7]. For each transmission within a bundle of the configured uplink grant, the sequence of redundancy versions is determined according to clause 6.1.2.3 of TS 38.214 [7].</p> <p>3GPP TS 38.321 v15.8.0 at 28.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                                                       | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                                                                                     | <p>New transmissions are performed on the resource and with the MCS indicated on either PDCCH, Random Access Response, or RRC. Retransmissions are performed on the resource and, if provided, with the MCS indicated on PDCCH, or on the same resource and with the same MCS as was used for last made transmission attempt within a bundle.</p> <p>If the HARQ entity requests a new transmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; store the MAC PDU in the associated HARQ buffer;</li> <li>1&gt; store the uplink grant received from the HARQ entity;</li> <li>1&gt; generate a transmission as described below.</li> </ul> <p>If the HARQ entity requests a retransmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; store the uplink grant received from the HARQ entity;</li> <li>1&gt; generate a transmission as described below.</li> </ul> <p>To generate a transmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; if the MAC PDU was obtained from the Msg3 buffer; or</li> <li>1&gt; if there is no measurement gap at the time of the transmission and, in case of retransmission, the retransmission does not collide with a transmission for a MAC PDU obtained from the Msg3 buffer;</li> <li>2&gt; instruct the physical layer to generate a transmission according to the stored uplink grant.</li> </ul> <p>3GPP TS 38.321 v15.8.0 at 30.</p> |
| [11.b] receiving, by the WTRU, uplink scheduling information from the base station, | <p>Each of the Accused LGE '247 Products is a user equipment that would have a wireless transmit/receive unit to receive uplink scheduling information from the base station.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a chipset, antenna or antennas, memory, and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and has a wireless transmit/receive unit to receive uplink scheduling information from the base station.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
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|                               | <p data-bbox="464 318 814 345">&lt;3GPP TS 38.321 v15.8.0&gt;</p> <p data-bbox="489 388 982 423"><b>5.4 UL-SCH data transfer</b></p> <p data-bbox="489 467 898 503"><b>5.4.1 UL Grant reception</b></p> <p data-bbox="489 526 1608 605">Uplink grant is either received dynamically on the PDCCH, in a Random Access Response, or configured semi-persistently by RRC. The MAC entity shall have an uplink grant to transmit on the UL-SCH. To perform the requested transmissions, the MAC layer receives HARQ information from lower layers.</p> <p data-bbox="489 630 1608 709">If the MAC entity has a C-RNTI, a Temporary C-RNTI, or CS-RNTI, the MAC entity shall for each PDCCH occasion and for each Serving Cell belonging to a TAG that has a running <i>timeAlignmentTimer</i> and for each grant received for this PDCCH occasion:</p> <ul style="list-style-type: none"> <li data-bbox="520 734 1549 784">1&gt; if an uplink grant for this Serving Cell has been received on the PDCCH for the MAC entity's C-RNTI or Temporary C-RNTI; or</li> <li data-bbox="520 808 1192 836">1&gt; if an uplink grant has been received in a Random Access Response: <ul style="list-style-type: none"> <li data-bbox="552 857 1608 937">2&gt; if the uplink grant is for MAC entity's C-RNTI and if the previous uplink grant delivered to the HARQ entity for the same HARQ process was either an uplink grant received for the MAC entity's CS-RNTI or a configured uplink grant: <ul style="list-style-type: none"> <li data-bbox="583 961 1619 1011">3&gt; consider the NDI to have been toggled for the corresponding HARQ process regardless of the value of the NDI.</li> </ul> </li> <li data-bbox="552 1036 1535 1086">2&gt; if the uplink grant is for MAC entity's C-RNTI, and the identified HARQ process is configured for a configured uplink grant: <ul style="list-style-type: none"> <li data-bbox="583 1110 1497 1133">3&gt; start or restart the <i>configuredGrantTimer</i> for the corresponding HARQ process, if configured.</li> </ul> </li> </ul> </li> <li data-bbox="552 1157 1371 1180">2&gt; deliver the uplink grant and the associated HARQ information to the HARQ entity.</li> </ul> <p data-bbox="464 1276 856 1304">3GPP TS 38.321 v15.8.0 at 27.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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|                               | <p data-bbox="457 305 814 332">&lt;3GPP TS 38.212 v15.8.0&gt;</p> <p data-bbox="506 418 1241 462"><b>7.3 Downlink control information</b></p> <p data-bbox="506 495 1478 522">A DCI transports downlink control information for one or more cells with one RNTI.</p> <p data-bbox="506 555 1020 583">The following coding steps can be identified:</p> <ul data-bbox="543 615 974 813" style="list-style-type: none"><li>- Information element multiplexing</li><li>- CRC attachment</li><li>- Channel coding</li><li>- Rate matching</li></ul> <p data-bbox="457 873 858 901">3GPP TS 38.212 v15.8.0 at 74.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
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|                               | <p data-bbox="499 310 844 345"><b>7.3.1 DCI formats</b></p> <p data-bbox="499 371 1083 401">The DCI formats defined in table 7.3.1-1 are supported.</p> <p data-bbox="968 435 1289 461" style="text-align: center;"><b>Table 7.3.1-1: DCI formats</b></p> <table data-bbox="642 485 1614 854"> <tr> <th data-bbox="642 485 963 542">DCI format</th><th data-bbox="963 485 1614 542">Usage</th></tr> <tr> <td data-bbox="642 542 963 571">0_0</td><td data-bbox="963 542 1614 571">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 571 963 600">0_1</td><td data-bbox="963 571 1614 600">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 600 963 630">1_0</td><td data-bbox="963 600 1614 630">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 630 963 659">1_1</td><td data-bbox="963 630 1614 659">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 659 963 688">2_0</td><td data-bbox="963 659 1614 688">Notifying a group of UEs of the slot format</td></tr> <tr> <td data-bbox="642 688 963 769">2_1</td><td data-bbox="963 688 1614 769">Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE</td></tr> <tr> <td data-bbox="642 769 963 799">2_2</td><td data-bbox="963 769 1614 799">Transmission of TPC commands for PUCCH and PUSCH</td></tr> <tr> <td data-bbox="642 799 963 854">2_3</td><td data-bbox="963 799 1614 854">Transmission of a group of TPC commands for SRS transmissions by one or more UEs</td></tr> </table> <p data-bbox="459 917 858 946">3GPP TS 38.212 v15.8.0 at 74.</p> | DCI format | Usage | 0_0 | Scheduling of PUSCH in one cell | 0_1 | Scheduling of PUSCH in one cell | 1_0 | Scheduling of PDSCH in one cell | 1_1 | Scheduling of PDSCH in one cell | 2_0 | Notifying a group of UEs of the slot format | 2_1 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | 2_2 | Transmission of TPC commands for PUCCH and PUSCH | 2_3 | Transmission of a group of TPC commands for SRS transmissions by one or more UEs |
| DCI format                    | Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_0                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_1                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_0                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_1                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_0                           | Notifying a group of UEs of the slot format                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_1                           | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_2                           | Transmission of TPC commands for PUCCH and PUSCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_3                           | Transmission of a group of TPC commands for SRS transmissions by one or more UEs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                               | <p>7.3.1.1 DCI formats for scheduling of PUSCH</p> <p>7.3.1.1.1 Format 0_0</p> <p>DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <p>The following information is transmitted by means of the DCI format 0_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:</p> <ul style="list-style-type: none"> <li>- Identifier for DCI formats – 1 bit</li> <li>- The value of this bit field is always set to 0, indicating an UL DCI format</li> <li>- Frequency domain resource assignment – <math>\left\lceil \log_2(N_{RB}^{UL,BWP}(N_{RB}^{UL,BWP} + 1)/2) \right\rceil</math> bits where <math>N_{RB}^{UL,BWP}</math> is defined in subclause 7.3.1.0</li> <li>- For PUSCH hopping with resource allocation type 1:</li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                               | <ul style="list-style-type: none"> <li>- <math>N_{UL\_hop}</math> MSB bits are used to indicate the frequency offset according to Subclause 6.3 of [6, TS 38.214], where <math>N_{UL\_hop} = 1</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains two offset values and <math>N_{UL\_hop} = 2</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains four offset values</li> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil - N_{UL\_hop}</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> <li>- For non-PUSCH hopping with resource allocation type 1: <ul style="list-style-type: none"> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> </ul> </li> <li>- Time domain resource assignment – 4 bits as defined in Subclause 6.1.2.1 of [6, TS 38.214]</li> <li>- Frequency hopping flag – 1 bit according to Table 7.3.1.1.1-3, as defined in Subclause 6.3 of [6, TS 38.214]</li> <li>- Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</li> <li>- New data indicator – 1 bit</li> <li>- Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2</li> <li>- HARQ process number – 4 bits</li> <li>- TPC command for scheduled PUSCH – 2 bits as defined in Subclause 7.1.1 of [5, TS 38.213]</li> <li>- Padding bits, if required.</li> <li>- UL/SUL indicator – 1 bit for UEs configured with <i>supplementaryUplink</i> in <i>ServingCellConfig</i> in the cell as defined in Table 7.3.1.1.1-1 and the number of bits for DCI format 1_0 before padding is larger than the number of bits for DCI format 0_0 before padding; 0 bit otherwise. The UL/SUL indicator, if present, locates in the last bit position of DCI format 0_0, after the padding bit(s). <ul style="list-style-type: none"> <li>- If the UL/SUL indicator is present in DCI format 0_0 and the higher layer parameter <i>pusch-Config</i> is not configured on both UL and SUL the UE ignores the UL/SUL indicator field in DCI format 0_0, and the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured;</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured.</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is not configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the uplink on which the latest PRACH is transmitted.</li> </ul> </li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                           | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
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|                                                         | <p>7.3.1.1.2            Format 0_1</p> <p>DCI format 0_1 is used for the scheduling of PUSCH in one cell.</p> <p>3GPP TS 38.212 v15.8.0 at 76-78.</p> <p><b>4.4            Functions</b></p> <p>The MAC sublayer supports the following functions:</p> <ul style="list-style-type: none"><li>- mapping between logical channels and transport channels;</li><li>- multiplexing of MAC SDUs from one or different logical channels onto transport blocks (TB) to be delivered to the physical layer on transport channels;</li><li>- demultiplexing of MAC SDUs to one or different logical channels from transport blocks (TB) delivered from the physical layer on transport channels;</li><li>- scheduling information reporting;</li><li>- error correction through HARQ;</li><li>- logical channel prioritisation.</li></ul> <p>The relevance of MAC functions for uplink and downlink is indicated in Table 4.4-1.</p> <p><b>Table 4.4-1: The link direction association of MAC functions.</b></p> <table><tr><th>MAC function</th><th>Downlink</th><th>Uplink</th></tr><tr><td>Mapping between logical channels and transport channels</td><td>X</td><td>X</td></tr><tr><td>Multiplexing</td><td></td><td>X</td></tr><tr><td>Demultiplexing</td><td>X</td><td></td></tr><tr><td>Scheduling information reporting</td><td></td><td>X</td></tr><tr><td>Error correction through HARQ</td><td>X</td><td>X</td></tr><tr><td>Logical Channel prioritisation</td><td></td><td>X</td></tr></table> <p>3GPP TS 38.321 v15.8.0 at 11.</p> | MAC function | Downlink | Uplink | Mapping between logical channels and transport channels | X | X | Multiplexing |  | X | Demultiplexing | X |  | Scheduling information reporting |  | X | Error correction through HARQ | X | X | Logical Channel prioritisation |  | X |
| MAC function                                            | Downlink                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Uplink       |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Mapping between logical channels and transport channels | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Multiplexing                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Demultiplexing                                          | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Scheduling information reporting                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Error correction through HARQ                           | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Logical Channel prioritisation                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                                                                                              | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
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| <p>[11.c] wherein the uplink scheduling information includes a H-ARQ process identification for the H-ARQ process; and</p> | <p>Each of the Accused LGE '247 Products is a user equipment that would have a wireless transmit/receive unit to receive uplink scheduling information from the base station that includes a H-ARQ process identification for the H-ARQ process.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a chipset, antenna or antennas, memory, and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and has a wireless transmit/receive unit to receive uplink scheduling information from the base station that includes a H-ARQ process identification for the H-ARQ process.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> <p><b>5.4.1 UL Grant reception</b></p> <p>Uplink grant is either received dynamically on the PDCCH, in a Random Access Response, or configured semi-persistently by RRC. The MAC entity shall have an uplink grant to transmit on the UL-SCH. To perform the requested transmissions, the MAC layer receives HARQ information from lower layers.</p> <p>3GPP TS 38.321 v15.8.0 at 27</p> <p><b>3.1 Definitions</b></p> <p>For the purposes of the present document, the terms and definitions given in TR 21.905 [1] and the following apply. A term defined in the present document takes precedence over the definition of the same term, if any, in TR 21.905 [1].</p> <p><b>HARQ information:</b> HARQ information for DL-SCH or for UL-SCH transmissions consists of New Data Indicator (NDI), Transport Block size (TBS), Redundancy Version (RV), and HARQ process ID.</p> <p>3GPP TS 38.321 v15.8.0 at 8.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                               | <p><b>5.4.2 HARQ operation</b></p> <p><b>5.4.2.1 HARQ Entity</b></p> <p>The MAC entity includes a HARQ entity for each Serving Cell with configured uplink (including the case when it is configured with <i>supplementaryUplink</i>), which maintains a number of parallel HARQ processes.</p> <p>The number of parallel UL HARQ processes per HARQ entity is specified in TS 38.214 [7].</p> <p>Each HARQ process supports one TB.</p> <p>Each HARQ process is associated with a HARQ process identifier. For UL transmission with UL grant in RA Response, HARQ process identifier 0 is used.</p> <p>3GPP TS 38.321 v15.8.0 at 28.</p> <p>For each Serving Cell and each configured uplink grant, if configured and activated, the MAC entity shall:</p> <ul style="list-style-type: none"> <li>1&gt; if the PUSCH duration of the configured uplink grant does not overlap with the PUSCH duration of an uplink grant received on the PDCCH or in a Random Access Response for this Serving Cell:</li> <li>2&gt; set the HARQ Process ID to the HARQ Process ID associated with this PUSCH duration;</li> <li>2&gt; if the <i>configuredGrantTimer</i> for the corresponding HARQ process is not running:</li> <li>3&gt; consider the NDI bit for the corresponding HARQ process to have been toggled;</li> <li>3&gt; deliver the configured uplink grant and the associated HARQ information to the HARQ entity.</li> </ul> <p>For configured uplink grants, the HARQ Process ID associated with the first symbol of a UL transmission is derived from the following equation:</p> $\text{HARQ Process ID} = [\text{floor}(\text{CURRENT\_symbol} / \text{periodicity})] \text{ modulo } n_{\text{rofHARQ-Processes}}$ <p>where <math>\text{CURRENT\_symbol} = (\text{SFN} \times \text{numberOfSlotsPerFrame} \times \text{numberOfSymbolsPerSlot} + \text{slot number in the frame} \times \text{numberOfSymbolsPerSlot} + \text{symbol number in the slot})</math>, and <i>numberOfSlotsPerFrame</i> and <i>numberOfSymbolsPerSlot</i> refer to the number of consecutive slots per frame and the number of consecutive symbols per slot, respectively as specified in TS 38.211 [8].</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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|                               | <p>3GPP TS 38.321 v15.8.0 at 27-28.</p> <p>&lt;3GPP TS 38.212 v15.8.0 &gt;</p> <h3>7.3 Downlink control information</h3> <p>A DCI transports downlink control information for one or more cells with one RNTI.</p> <p>The following coding steps can be identified:</p> <ul style="list-style-type: none"><li>- Information element multiplexing</li><li>- CRC attachment</li><li>- Channel coding</li><li>- Rate matching</li></ul> <p>3GPP TS 38.212 v15.8.0 at 74.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
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|                               | <p data-bbox="499 310 844 345"><b>7.3.1 DCI formats</b></p> <p data-bbox="499 371 1083 401">The DCI formats defined in table 7.3.1-1 are supported.</p> <p data-bbox="968 435 1289 459" style="text-align: center;"><b>Table 7.3.1-1: DCI formats</b></p> <table data-bbox="642 485 1614 854"> <tr> <th data-bbox="642 485 966 542">DCI format</th><th data-bbox="966 485 1614 542">Usage</th></tr> <tr> <td data-bbox="642 542 966 571">0_0</td><td data-bbox="966 542 1614 571">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 571 966 600">0_1</td><td data-bbox="966 571 1614 600">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 600 966 630">1_0</td><td data-bbox="966 600 1614 630">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 630 966 659">1_1</td><td data-bbox="966 630 1614 659">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 659 966 688">2_0</td><td data-bbox="966 659 1614 688">Notifying a group of UEs of the slot format</td></tr> <tr> <td data-bbox="642 688 966 769">2_1</td><td data-bbox="966 688 1614 769">Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE</td></tr> <tr> <td data-bbox="642 769 966 799">2_2</td><td data-bbox="966 769 1614 799">Transmission of TPC commands for PUCCH and PUSCH</td></tr> <tr> <td data-bbox="642 799 966 854">2_3</td><td data-bbox="966 799 1614 854">Transmission of a group of TPC commands for SRS transmissions by one or more UEs</td></tr> </table> <p data-bbox="459 917 858 946">3GPP TS 38.212 v15.8.0 at 74.</p> | DCI format | Usage | 0_0 | Scheduling of PUSCH in one cell | 0_1 | Scheduling of PUSCH in one cell | 1_0 | Scheduling of PDSCH in one cell | 1_1 | Scheduling of PDSCH in one cell | 2_0 | Notifying a group of UEs of the slot format | 2_1 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | 2_2 | Transmission of TPC commands for PUCCH and PUSCH | 2_3 | Transmission of a group of TPC commands for SRS transmissions by one or more UEs |
| DCI format                    | Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_0                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_1                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_0                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_1                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_0                           | Notifying a group of UEs of the slot format                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_1                           | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_2                           | Transmission of TPC commands for PUCCH and PUSCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_3                           | Transmission of a group of TPC commands for SRS transmissions by one or more UEs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                               | <p>7.3.1.1 DCI formats for scheduling of PUSCH</p> <p>7.3.1.1.1 Format 0_0</p> <p>DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <p>The following information is transmitted by means of the DCI format 0_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:</p> <ul style="list-style-type: none"> <li>- Identifier for DCI formats – 1 bit</li> <li>- The value of this bit field is always set to 0, indicating an UL DCI format</li> <li>- Frequency domain resource assignment – <math>\left\lceil \log_2(N_{RB}^{UL,BWP}(N_{RB}^{UL,BWP} + 1)/2) \right\rceil</math> bits where <math>N_{RB}^{UL,BWP}</math> is defined in subclause 7.3.1.0</li> <li>- For PUSCH hopping with resource allocation type 1:</li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                               | <ul style="list-style-type: none"> <li>- <math>N_{UL\_hop}</math> MSB bits are used to indicate the frequency offset according to Subclause 6.3 of [6, TS 38.214], where <math>N_{UL\_hop} = 1</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains two offset values and <math>N_{UL\_hop} = 2</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains four offset values</li> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil - N_{UL\_hop}</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> <li>- For non-PUSCH hopping with resource allocation type 1: <ul style="list-style-type: none"> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> </ul> </li> <li>- Time domain resource assignment – 4 bits as defined in Subclause 6.1.2.1 of [6, TS 38.214]</li> <li>- Frequency hopping flag – 1 bit according to Table 7.3.1.1.1-3, as defined in Subclause 6.3 of [6, TS 38.214]</li> <li>- Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</li> <li>- New data indicator – 1 bit</li> <li>- Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2</li> <li>- HARQ process number – 4 bits</li> <li>- TPC command for scheduled PUSCH – 2 bits as defined in Subclause 7.1.1 of [5, TS 38.213]</li> <li>- Padding bits, if required.</li> <li>- UL/SUL indicator – 1 bit for UEs configured with <i>supplementaryUplink</i> in <i>ServingCellConfig</i> in the cell as defined in Table 7.3.1.1.1-1 and the number of bits for DCI format 1_0 before padding is larger than the number of bits for DCI format 0_0 before padding; 0 bit otherwise. The UL/SUL indicator, if present, locates in the last bit position of DCI format 0_0, after the padding bit(s). <ul style="list-style-type: none"> <li>- If the UL/SUL indicator is present in DCI format 0_0 and the higher layer parameter <i>pusch-Config</i> is not configured on both UL and SUL the UE ignores the UL/SUL indicator field in DCI format 0_0, and the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured;</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured.</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is not configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the uplink on which the latest PRACH is transmitted.</li> </ul> </li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                           | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
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|                                                         | <p>7.3.1.1.2            Format 0_1</p> <p>DCI format 0_1 is used for the scheduling of PUSCH in one cell.</p> <p>3GPP TS 38.212 v15.8.0 at 76-78.</p> <p><b>4.4            Functions</b></p> <p>The MAC sublayer supports the following functions:</p> <ul style="list-style-type: none"><li>- mapping between logical channels and transport channels;</li><li>- multiplexing of MAC SDUs from one or different logical channels onto transport blocks (TB) to be delivered to the physical layer on transport channels;</li><li>- demultiplexing of MAC SDUs to one or different logical channels from transport blocks (TB) delivered from the physical layer on transport channels;</li><li>- scheduling information reporting;</li><li>- error correction through HARQ;</li><li>- logical channel prioritisation.</li></ul> <p>The relevance of MAC functions for uplink and downlink is indicated in Table 4.4-1.</p> <p><b>Table 4.4-1: The link direction association of MAC functions.</b></p> <table><tr><th>MAC function</th><th>Downlink</th><th>Uplink</th></tr><tr><td>Mapping between logical channels and transport channels</td><td>X</td><td>X</td></tr><tr><td>Multiplexing</td><td></td><td>X</td></tr><tr><td>Demultiplexing</td><td>X</td><td></td></tr><tr><td>Scheduling information reporting</td><td></td><td>X</td></tr><tr><td>Error correction through HARQ</td><td>X</td><td>X</td></tr><tr><td>Logical Channel prioritisation</td><td></td><td>X</td></tr></table> <p>3GPP TS 38.321 v15.8.0 at 11.</p> | MAC function | Downlink | Uplink | Mapping between logical channels and transport channels | X | X | Multiplexing |  | X | Demultiplexing | X |  | Scheduling information reporting |  | X | Error correction through HARQ | X | X | Logical Channel prioritisation |  | X |
| MAC function                                            | Downlink                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Uplink       |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Mapping between logical channels and transport channels | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Multiplexing                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Demultiplexing                                          | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Scheduling information reporting                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Error correction through HARQ                           | X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |
| Logical Channel prioritisation                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | X            |          |        |                                                         |   |   |              |  |   |                |   |  |                                  |  |   |                               |   |   |                                |  |   |

**APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247**

| <b>U.S. Patent No.<br/>10,869,247</b>                                                                                                                                                                                                        | <b>Exemplary Evidence of Infringement</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| <p>[11.d]<br/>determining, by the WTRU, whether to retransmit the data block based on the received uplink scheduling information and not based on whether the WTRU has received a negative acknowledgement (NACK) from the base station.</p> | <p>Each of the Accused LGE '247 Products is a user equipment that would determine whether to retransmit the data block based on the received uplink scheduling information and not based on whether the WTRU has received a negative acknowledgement (NACK) from the base station.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a processor and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and supports determining whether to retransmit the data block based on the received uplink scheduling information and not based on whether the WTRU has received a negative acknowledgement (NACK) from the base station.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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|                               | <p><b>5.4 UL-SCH data transfer</b></p> <p><b>5.4.1 UL Grant reception</b></p> <p>Uplink grant is either received dynamically on the PDCCH, in a Random Access Response, or configured semi-persistently by RRC. The MAC entity shall have an uplink grant to transmit on the UL-SCH. To perform the requested transmissions, the MAC layer receives HARQ information from lower layers.</p> <p>If the MAC entity has a C-RNTI, a Temporary C-RNTI, or CS-RNTI, the MAC entity shall for each PDCCH occasion and for each Serving Cell belonging to a TAG that has a running <i>timeAlignmentTimer</i> and for each grant received for this PDCCH occasion:</p> <ul style="list-style-type: none"> <li>1&gt; if an uplink grant for this Serving Cell has been received on the PDCCH for the MAC entity's C-RNTI or Temporary C-RNTI; or</li> <li>1&gt; if an uplink grant has been received in a Random Access Response: <ul style="list-style-type: none"> <li>2&gt; if the uplink grant is for MAC entity's C-RNTI and if the previous uplink grant delivered to the HARQ entity for the same HARQ process was either an uplink grant received for the MAC entity's CS-RNTI or a configured uplink grant: <ul style="list-style-type: none"> <li>3&gt; consider the NDI to have been toggled for the corresponding HARQ process regardless of the value of the NDI.</li> </ul> </li> <li>2&gt; if the uplink grant is for MAC entity's C-RNTI, and the identified HARQ process is configured for a configured uplink grant: <ul style="list-style-type: none"> <li>3&gt; start or restart the <i>configuredGrantTimer</i> for the corresponding HARQ process, if configured.</li> </ul> </li> </ul> </li> <li>2&gt; deliver the uplink grant and the associated HARQ information to the HARQ entity.</li> </ul> <p>3GPP TS 38.321 v15.8.0 at 27.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
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|                               | <p data-bbox="457 305 814 332">&lt;3GPP TS 38.212 v15.8.0&gt;</p> <p data-bbox="499 414 844 451"><b>7.3.1 DCI formats</b></p> <p data-bbox="499 479 1081 506">The DCI formats defined in table 7.3.1-1 are supported.</p> <p data-bbox="968 540 1289 568"><b>Table 7.3.1-1: DCI formats</b></p> <table data-bbox="642 591 1614 958"> <tr> <th data-bbox="642 591 963 646">DCI format</th><th data-bbox="963 591 1614 646">Usage</th></tr> <tr> <td data-bbox="642 646 963 673">0_0</td><td data-bbox="963 646 1614 673">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 673 963 701">0_1</td><td data-bbox="963 673 1614 701">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 701 963 729">1_0</td><td data-bbox="963 701 1614 729">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 729 963 756">1_1</td><td data-bbox="963 729 1614 756">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 756 963 784">2_0</td><td data-bbox="963 756 1614 784">Notifying a group of UEs of the slot format</td></tr> <tr> <td data-bbox="642 784 963 873">2_1</td><td data-bbox="963 784 1614 873">Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE</td></tr> <tr> <td data-bbox="642 873 963 901">2_2</td><td data-bbox="963 873 1614 901">Transmission of TPC commands for PUCCH and PUSCH</td></tr> <tr> <td data-bbox="642 901 963 958">2_3</td><td data-bbox="963 901 1614 958">Transmission of a group of TPC commands for SRS transmissions by one or more UEs</td></tr> </table> <p data-bbox="457 1023 856 1050">3GPP TS 38.212 v15.8.0 at 74.</p> | DCI format | Usage | 0_0 | Scheduling of PUSCH in one cell | 0_1 | Scheduling of PUSCH in one cell | 1_0 | Scheduling of PDSCH in one cell | 1_1 | Scheduling of PDSCH in one cell | 2_0 | Notifying a group of UEs of the slot format | 2_1 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | 2_2 | Transmission of TPC commands for PUCCH and PUSCH | 2_3 | Transmission of a group of TPC commands for SRS transmissions by one or more UEs |
| DCI format                    | Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_0                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_1                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_0                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_1                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_0                           | Notifying a group of UEs of the slot format                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_1                           | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_2                           | Transmission of TPC commands for PUCCH and PUSCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_3                           | Transmission of a group of TPC commands for SRS transmissions by one or more UEs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|                               | <p>7.3.1.1 DCI formats for scheduling of PUSCH</p> <p>7.3.1.1.1 Format 0_0</p> <p>DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <p>The following information is transmitted by means of the DCI format 0_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:</p> <ul style="list-style-type: none"> <li>- Identifier for DCI formats – 1 bit</li> <li>- The value of this bit field is always set to 0, indicating an UL DCI format</li> <li>- Frequency domain resource assignment – <math>\lceil \log_2(N_{RB}^{UL,BWP}(N_{RB}^{UL,BWP} + 1)/2) \rceil</math> bits where <math>N_{RB}^{UL,BWP}</math> is defined in subclause 7.3.1.0</li> <li>- For PUSCH hopping with resource allocation type 1:</li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                               | <ul style="list-style-type: none"> <li>- <math>N_{UL\_hop}</math> MSB bits are used to indicate the frequency offset according to Subclause 6.3 of [6, TS 38.214], where <math>N_{UL\_hop} = 1</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains two offset values and <math>N_{UL\_hop} = 2</math> if the higher layer parameter <i>frequencyHoppingOffsetLists</i> contains four offset values</li> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil - N_{UL\_hop}</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> <li>- For non-PUSCH hopping with resource allocation type 1: <ul style="list-style-type: none"> <li>- <math>\left\lceil \log_2(N_{RB}^{ULBWP}(N_{RB}^{ULBWP} + 1)/2) \right\rceil</math> bits provides the frequency domain resource allocation according to Subclause 6.1.2.2.2 of [6, TS 38.214]</li> </ul> </li> <li>- Time domain resource assignment – 4 bits as defined in Subclause 6.1.2.1 of [6, TS 38.214]</li> <li>- Frequency hopping flag – 1 bit according to Table 7.3.1.1.1-3, as defined in Subclause 6.3 of [6, TS 38.214]</li> <li>- Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</li> <li>- New data indicator – 1 bit</li> <li>- Redundancy version – 2 bits as defined in Table 7.3.1.1.1-2</li> <li>- HARQ process number – 4 bits</li> <li>- TPC command for scheduled PUSCH – 2 bits as defined in Subclause 7.1.1 of [5, TS 38.213]</li> <li>- Padding bits, if required.</li> <li>- UL/SUL indicator – 1 bit for UEs configured with <i>supplementaryUplink</i> in <i>ServingCellConfig</i> in the cell as defined in Table 7.3.1.1.1-1 and the number of bits for DCI format 1_0 before padding is larger than the number of bits for DCI format 0_0 before padding; 0 bit otherwise. The UL/SUL indicator, if present, locates in the last bit position of DCI format 0_0, after the padding bit(s). <ul style="list-style-type: none"> <li>- If the UL/SUL indicator is present in DCI format 0_0 and the higher layer parameter <i>pusch-Config</i> is not configured on both UL and SUL the UE ignores the UL/SUL indicator field in DCI format 0_0, and the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured;</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the UL or SUL for which high layer parameter <i>pucch-Config</i> is configured.</li> <li>- If the UL/SUL indicator is not present in DCI format 0_0 and <i>pucch-Config</i> is not configured, the corresponding PUSCH scheduled by the DCI format 0_0 is for the uplink on which the latest PRACH is transmitted.</li> </ul> </li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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|                               | <p data-bbox="512 313 884 345"><b>7.3.1.1.2      Format 0_1</b></p> <p data-bbox="512 370 1203 402">DCI format 0_1 is used for the scheduling of PUSCH in one cell.</p> <p data-bbox="464 459 898 492">3GPP TS 38.212 v15.8.0 at 76-78.</p> <p data-bbox="499 524 869 557"><b>5.4.2      HARQ operation</b></p> <p data-bbox="499 597 821 630"><b>5.4.2.1      HARQ Entity</b></p> <p data-bbox="499 654 1583 703">The MAC entity includes a HARQ entity for each Serving Cell with configured uplink (including the case when it is configured with <i>supplementaryUplink</i>), which maintains a number of parallel HARQ processes.</p> <p data-bbox="499 727 1356 751">The number of parallel UL HARQ processes per HARQ entity is specified in TS 38.214 [7].</p> <p data-bbox="499 776 856 800">Each HARQ process supports one TB.</p> <p data-bbox="499 824 1520 873">Each HARQ process is associated with a HARQ process identifier. For UL transmission with UL grant in RA Response, HARQ process identifier 0 is used.</p> <p data-bbox="499 898 1608 1166">When the MAC entity is configured with <i>pusch-AggregationFactor</i> &gt; 1, the parameter <i>pusch-AggregationFactor</i> provides the number of transmissions of a TB within a bundle of the dynamic grant. After the initial transmission, <i>pusch-AggregationFactor</i> – 1 HARQ retransmissions follow within a bundle. When the MAC entity is configured with <i>repK</i> &gt; 1, the parameter <i>repK</i> provides the number of transmissions of a TB within a bundle of the configured uplink grant. After the initial transmission, HARQ retransmissions follow within a bundle. For both dynamic grant and configured uplink grant, bundling operation relies on the HARQ entity for invoking the same HARQ process for each transmission that is part of the same bundle. Within a bundle, HARQ retransmissions are triggered without waiting for feedback from previous transmission according to <i>pusch-AggregationFactor</i> for a dynamic grant and <i>repK</i> for a configured uplink grant, respectively. Each transmission within a bundle is a separate uplink grant after the initial uplink grant within a bundle is delivered to the HARQ entity.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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|                               | <p>For each uplink grant, the HARQ entity shall:</p> <ul style="list-style-type: none"> <li>1&gt; identify the HARQ process associated with this grant, and for each identified HARQ process: <ul style="list-style-type: none"> <li>2&gt; if the received grant was not addressed to a Temporary C-RNTI on PDCCH, and the NDI provided in the associated HARQ information has been toggled compared to the value in the previous transmission of this TB of this HARQ process; or</li> </ul> </li> <li>2&gt; if the uplink grant was received on PDCCH for the C-RNTI and the HARQ buffer of the identified process is empty; or</li> <li>2&gt; if the uplink grant was received in a Random Access Response; or</li> <li>2&gt; if the uplink grant was received on PDCCH for the C-RNTI in <i>ra-ResponseWindow</i> and this PDCCH successfully completed the Random Access procedure initiated for beam failure recovery; or</li> <li>2&gt; if the uplink grant is part of a bundle of the configured uplink grant, and may be used for initial transmission according to clause 6.1.2.3 of TS 38.214 [7], and if no MAC PDU has been obtained for this bundle: <ul style="list-style-type: none"> <li>3&gt; if there is a MAC PDU in the Msg3 buffer and the uplink grant was received in a Random Access Response; or:</li> <li>3&gt; if there is a MAC PDU in the Msg3 buffer and the uplink grant was received on PDCCH for the C-RNTI in <i>ra-ResponseWindow</i> and this PDCCH successfully completed the Random Access procedure initiated for beam failure recovery;</li> </ul> </li> <li>4&gt; obtain the MAC PDU to transmit from the Msg3 buffer.</li> <li>4&gt; if the uplink grant size does not match with size of the obtained MAC PDU; and</li> <li>4&gt; if the Random Access procedure was successfully completed upon receiving the uplink grant: <ul style="list-style-type: none"> <li>5&gt; indicate to the Multiplexing and assembly entity to include MAC subPDU(s) carrying MAC SDU from the obtained MAC PDU in the subsequent uplink transmission;</li> <li>5&gt; obtain the MAC PDU to transmit from the Multiplexing and assembly entity.</li> </ul> </li> </ul> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
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|                               | <p>3&gt; else:</p> <p>4&gt; obtain the MAC PDU to transmit from the Multiplexing and assembly entity, if any;</p> <p>3&gt; if a MAC PDU to transmit has been obtained:</p> <p>4&gt; deliver the MAC PDU and the uplink grant and the HARQ information of the TB to the identified HARQ process;</p> <p>4&gt; instruct the identified HARQ process to trigger a new transmission;</p> <p>4&gt; if the uplink grant is addressed to CS-RNTI; or</p> <p>4&gt; if the uplink grant is a configured uplink grant; or</p> <p>4&gt; if the uplink grant is addressed to C-RNTI, and the identified HARQ process is configured for a configured uplink grant:</p> <p>5&gt; start or restart the <i>configuredGrantTimer</i>, if configured, for the corresponding HARQ process when the transmission is performed.</p> <p>3&gt; else:</p> <p>4&gt; flush the HARQ buffer of the identified HARQ process.</p> <p>2&gt; else (i.e. retransmission):</p> <p>3&gt; if the uplink grant received on PDCCH was addressed to CS-RNTI and if the HARQ buffer of the identified process is empty; or</p> <p>3&gt; if the uplink grant is part of a bundle and if no MAC PDU has been obtained for this bundle; or</p> <p>3&gt; if the uplink grant is part of a bundle of the configured uplink grant, and the PUSCH duration of the uplink grant overlaps with a PUSCH duration of another uplink grant received on the PDCCH or in a Random Access Response for this Serving Cell:</p> <p>4&gt; ignore the uplink grant.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247                                                                                    | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                  | <pre> 3&gt; else:      4&gt; deliver the uplink grant and the HARQ information (redundancy version) of the TB to the identified         HARQ process;      4&gt; instruct the identified HARQ process to trigger a retransmission;      4&gt; if the uplink grant is addressed to CS-RNTI; or      4&gt; if the uplink grant is addressed to C-RNTI, and the identified HARQ process is configured for a         configured uplink grant:          5&gt; start or restart the <i>configuredGrantTimer</i>, if configured, for the corresponding HARQ process             when the transmission is performed. </pre> <p>3GPP TS 38.321 v15.8.0 at 28-30.</p>                                                                                                                         |
| [12.pre]The method of claim 11 further comprising                                                                | See claim 11.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| [12.a] in response to a determination to retransmit the data block, retransmitting, by the WTRU, the data block. | <p>Each of the Accused LGE '247 Products is a user equipment that would, in response to a determination to retransmit the data block, retransmit, by the WTRU, the data block.</p> <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a chipset, antenna or antennas, memory, and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and is configured to cause the WTRU to, in response to a determination to retransmit the data block, retransmit the data block.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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|                               | <p style="margin-left: 40px;"><b>5.4.2 HARQ operation</b></p> <p style="margin-left: 40px;"><b>5.4.2.1 HARQ entity</b></p> <p style="margin-left: 20px;">2&gt; else (i.e. retransmission):</p> <p style="margin-left: 40px;">3&gt; if the uplink grant received on PDCCH was addressed to CS-RNTI and if the HARQ buffer of the identified process is empty; or</p> <p style="margin-left: 40px;">3&gt; if the uplink grant is part of a bundle and if no MAC PDU has been obtained for this bundle; or</p> <p style="margin-left: 40px;">3&gt; if the uplink grant is part of a bundle of the configured uplink grant, and the PUSCH duration of the uplink grant overlaps with a PUSCH duration of another uplink grant received on the PDCCH or in a Random Access Response for this Serving Cell:</p> <p style="margin-left: 40px;">4&gt; ignore the uplink grant.</p> <p style="margin-left: 20px;">3&gt; else:</p> <p style="margin-left: 40px;">4&gt; deliver the uplink grant and the HARQ information (redundancy version) of the TB to the identified HARQ process;</p> <p style="margin-left: 40px;">4&gt; instruct the identified HARQ process to trigger a retransmission;</p> <p style="margin-left: 40px;">4&gt; if the uplink grant is addressed to CS-RNTI; or</p> <p style="margin-left: 40px;">4&gt; if the uplink grant is addressed to C-RNTI, and the identified HARQ process is configured for a configured uplink grant:</p> <p style="margin-left: 60px;">5&gt; start or restart the <i>configuredGrantTimer</i>, if configured, for the corresponding HARQ process when the transmission is performed.</p> <p>3GPP TS 38.321 v15.8.0 at 28-30.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247             | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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|                                           | <p><b>5.4.2.2 HARQ process</b></p> <p>Each HARQ process is associated with a HARQ buffer.</p> <p>New transmissions are performed on the resource and with the MCS indicated on either PDCCH, Random Access Response, or RRC. Retransmissions are performed on the resource and, if provided, with the MCS indicated on PDCCH, or on the same resource and with the same MCS as was used for last made transmission attempt within a bundle.</p> <p>If the HARQ entity requests a new transmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; store the MAC PDU in the associated HARQ buffer;</li> <li>1&gt; store the uplink grant received from the HARQ entity;</li> <li>1&gt; generate a transmission as described below.</li> </ul> <p>If the HARQ entity requests a retransmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; store the uplink grant received from the HARQ entity;</li> <li>1&gt; generate a transmission as described below.</li> </ul> <p>To generate a transmission for a TB, the HARQ process shall:</p> <ul style="list-style-type: none"> <li>1&gt; if the MAC PDU was obtained from the Msg3 buffer; or</li> <li>1&gt; if there is no measurement gap at the time of the transmission and, in case of retransmission, the retransmission does not collide with a transmission for a MAC PDU obtained from the Msg3 buffer:</li> <li>2&gt; instruct the physical layer to generate a transmission according to the stored uplink grant.</li> </ul> <p>3GPP TS 38.321 v15.8.0 at 30.</p> |
| [18.pre] The method of claim 11,          | See claim 11.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| [18.a] wherein the scheduling information | Each of the Accused LGE '247 Products is a user equipment configured to receive scheduling information that indicates a modulation and coding scheme.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247             | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| indicates a modulation and coding scheme. | <p>As shown in Appendix 1, each of the Accused LGE '247 Products incorporates a chipset, antenna or antennas, memory, and transceiver or combination of transmitter and receiver that operate in accordance with 5G-NR cellular standard. Each Accused LGE '247 Products complies with one or more of 5G-NR Release 15 or later cellular communication protocols including at least 3GPP TS 38.321 and 3GPP TS 38.212, and is configured to receive scheduling information that indicates a modulation and coding scheme.</p> <p>&lt;3GPP TS 38.321 v15.8.0&gt;</p> <p><b>5.4.1 UL Grant reception</b></p> <p>Uplink grant is either received dynamically on the PDCCH, in a Random Access Response, or configured semi-persistently by RRC. The MAC entity shall have an uplink grant to transmit on the UL-SCH. To perform the requested transmissions, the MAC layer receives HARQ information from lower layers.</p> <p>3GPP TS 38.321 v15.8.0 at 27.</p> <p><b>5.4.2.1 HARQ Entity</b></p> <p>The MAC entity includes a HARQ entity for each Serving Cell with configured uplink (including the case when it is configured with <i>supplementaryUplink</i>), which maintains a number of parallel HARQ processes.</p> <p>The number of parallel UL HARQ processes per HARQ entity is specified in TS 38.214 [7].</p> <p>Each HARQ process supports one TB.</p> <p>Each HARQ process is associated with a HARQ process identifier. For UL transmission with UL grant in RA Response, HARQ process identifier 0 is used.</p> <p>3GPP TS 38.321 v15.8.0 at 28.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|                               | <p><b>5.4.2.2 HARQ process</b></p> <p>Each HARQ process is associated with a HARQ buffer.</p> <p>New transmissions are performed on the resource and with the MCS indicated on either PDCCH, Random Access Response, or RRC. Retransmissions are performed on the resource and, if provided, with the MCS indicated on PDCCH, or on the same resource and with the same MCS as was used for last made transmission attempt within a bundle.</p> <p>3GPP TS 38.321 v15.8.0 at 30.</p> <p>&lt;3GPP TS 38.212 v15.8.0&gt;</p><br><p><b>7.3.1.1 DCI formats for scheduling of PUSCH</b></p><br><p><b>7.3.1.1.1 Format 0_0</b></p> <p>DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <p>3GPP TS 38.212 v15.8.0 at 76.</p><br><p><b>7.3.1.1.2 Format 0_1</b></p> <p>DCI format 0_1 is used for the scheduling of PUSCH in one cell.</p> <p>3GPP TS 38.212 v15.8.0 at 78.</p> |

## APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-------|-----|---------------------------------|-----|---------------------------------|-----|---------------------------------|-----|---------------------------------|-----|---------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------|-----|--------------------------------------------------|-----|----------------------------------------------------------------------------------|
|                               | <p data-bbox="499 305 844 342"><b>7.3.1 DCI formats</b></p> <p data-bbox="499 370 1083 399">The DCI formats defined in table 7.3.1-1 are supported.</p> <p data-bbox="968 431 1289 456" style="text-align: center;"><b>Table 7.3.1-1: DCI formats</b></p> <table data-bbox="642 483 1614 852"> <tr> <th data-bbox="642 483 966 540">DCI format</th><th data-bbox="966 483 1614 540">Usage</th></tr> <tr> <td data-bbox="642 540 966 570">0_0</td><td data-bbox="966 540 1614 570">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 570 966 599">0_1</td><td data-bbox="966 570 1614 599">Scheduling of PUSCH in one cell</td></tr> <tr> <td data-bbox="642 599 966 628">1_0</td><td data-bbox="966 599 1614 628">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 628 966 657">1_1</td><td data-bbox="966 628 1614 657">Scheduling of PDSCH in one cell</td></tr> <tr> <td data-bbox="642 657 966 686">2_0</td><td data-bbox="966 657 1614 686">Notifying a group of UEs of the slot format</td></tr> <tr> <td data-bbox="642 686 966 768">2_1</td><td data-bbox="966 686 1614 768">Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE</td></tr> <tr> <td data-bbox="642 768 966 797">2_2</td><td data-bbox="966 768 1614 797">Transmission of TPC commands for PUCCH and PUSCH</td></tr> <tr> <td data-bbox="642 797 966 852">2_3</td><td data-bbox="966 797 1614 852">Transmission of a group of TPC commands for SRS transmissions by one or more UEs</td></tr> </table> <p data-bbox="459 915 858 945">3GPP TS 38.212 v15.8.0 at 74.</p> <p data-bbox="489 1037 867 1068"><b>7.3.1.1.1 Format 0_0</b></p> <p data-bbox="489 1097 1182 1127">DCI format 0_0 is used for the scheduling of PUSCH in one cell.</p> <ul data-bbox="474 1174 1512 1203" style="list-style-type: none"> <li>- Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</li> </ul> <p data-bbox="459 1245 903 1274">3GPP TS 38.212 v15.8.0 at 76-77.</p> | DCI format | Usage | 0_0 | Scheduling of PUSCH in one cell | 0_1 | Scheduling of PUSCH in one cell | 1_0 | Scheduling of PDSCH in one cell | 1_1 | Scheduling of PDSCH in one cell | 2_0 | Notifying a group of UEs of the slot format | 2_1 | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE | 2_2 | Transmission of TPC commands for PUCCH and PUSCH | 2_3 | Transmission of a group of TPC commands for SRS transmissions by one or more UEs |
| DCI format                    | Usage                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_0                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 0_1                           | Scheduling of PUSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_0                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 1_1                           | Scheduling of PDSCH in one cell                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_0                           | Notifying a group of UEs of the slot format                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_1                           | Notifying a group of UEs of the PRB(s) and OFDM symbol(s) where UE may assume no transmission is intended for the UE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_2                           | Transmission of TPC commands for PUCCH and PUSCH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |
| 2_3                           | Transmission of a group of TPC commands for SRS transmissions by one or more UEs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |            |       |     |                                 |     |                                 |     |                                 |     |                                 |     |                                             |     |                                                                                                                      |     |                                                  |     |                                                                                  |

**APPENDIX 5: PRELIMINARY INFRINGEMENT CONTENTIONS OF U.S. PATENT NO. 10,869,247**

| U.S. Patent No.<br>10,869,247 | Exemplary Evidence of Infringement                                                                                                                                                                                                                                                                                                                                    |
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|                               | <p data-bbox="470 321 846 358">7.3.1.1.2      Format 0_1</p> <p data-bbox="470 378 1163 410">DCI format 0_1 is used for the scheduling of PUSCH in one cell.</p> <p data-bbox="470 475 1509 508">-    Modulation and coding scheme – 5 bits as defined in Subclause 6.1.4.1 of [6, TS 38.214]</p> <p data-bbox="462 544 900 576">3GPP TS 38.212 v15.8.0 at 78-80.</p> |