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**H04L 1/1867** <sup>(2023.01)</sup> **H04L 1/1812** <sup>(2023.01)</sup>  
**H04W 72/1268** <sup>(2023.01)</sup>
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**H04L 1/1887; H04L 1/1896; H04W 72/1268;**  
**H04L 1/1819; H04L 1/188; H04W 72/23;**  
**H04W 72/569**

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**18743928.6 / 3 646 504**
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(54) **PERIODIC GRANTS FOR MULTIPLE TRANSMISSION TIME INTERVAL CONFIGURATIONS**

(57) Methods, systems, and devices for wireless communication are described. Semi-persistent scheduling (SPS) configurations that enable uplink transmissions during different transmission time intervals (TTIs) may be used. For example, a base station may configure SPS for a set of TTIs, where the configuration may include a periodicity between shortened TTIs (sTTIs) (e.g., two-symbol, three-symbol, seven-symbol TTIs, etc.) that may be used by a user equipment (UE) for uplink trans-

missions. The base station may signal the SPS configuration to the UE, and the UE may then identify locations of TTIs for use in SPS transmissions. For instance, the UE may identify the location of a set of sTTIs that are designated for SPS and that occur at a certain periodicity indicated by the configuration. Upon identifying the TTI locations, the UE may transmit uplink data during one or more of the identified TTIs in accordance with the periodicity.

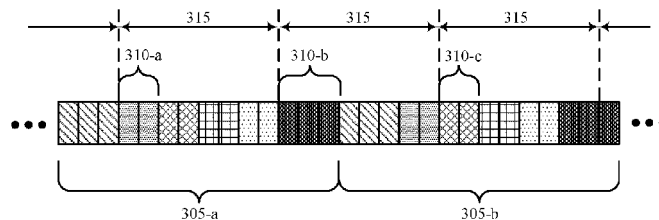


FIG. 3

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EUROPEAN SEARCH REPORT

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	HUAWEI ET AL: "Collision of new transmission and retransmission in short SPS period", 3GPP DRAFT; R2-163913 COLLISION OF NEW TRANSMISSION AND RETRANSMISSION IN SHORT SPS PERIOD, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPH , vol. RAN WG2, no. Nanjing, China; 20160523 - 20160527 22 May 2016 (2016-05-22), XP051105288, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/Meetings_3GPP_SYNC/RAN2/Docs/ [retrieved on 2016-05-22] * the whole document *	1-13,15	INV. H04L1/1867 H04L1/1812 H04W72/1268
A	WO 2017/052706 A1 (INTEL IP CORP [US]) 30 March 2017 (2017-03-30) * paragraphs [0035] - [0036] * * paragraphs [0051] - [0055] * * paragraph [0073] * * paragraphs [0082] - [0083] * * figure 3 *  ----- -/--	1-13,15	TECHNICAL FIELDS SEARCHED (IPC)  H04L
The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>26 February 2024</b>	Examiner <b>Christopoulou, K</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	<p>ERICSSON: "SPS operation on sTTI", 3GPP DRAFT; [SHORTTTI] R2-1705829 - SPS OPERATION ON STTI (UPDATE), 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRA</p> <p>, vol. RAN WG2, no. Hangzhou; 20170515 - 20170519 12 May 2017 (2017-05-12), XP051285678, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_ran/WG2_RL 2/TSGR2_98/Docs/ [retrieved on 2017-05-12] * the whole document *</p> <p>-----</p>	1-13,15	
A	<p>CATT: "Discussion on multiplexing of normal TTI and sTTI in UL", 3GPP DRAFT; R1-1707429, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE</p> <p>, vol. RAN WG1, no. Hangzhou, China; 20170515 - 20170519 14 May 2017 (2017-05-14), XP051272638, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/Meetings_3GPP_ SYNC/RAN1/Docs/ [retrieved on 2017-05-14] * the whole document *</p> <p>-----</p> <p style="text-align: right;">-/--</p>	1-13,15	
The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>26 February 2024</b>	Examiner <b>Christopoulou, K</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		<p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... &amp; : member of the same patent family, corresponding document</p>	

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	<p>LG ELECTRONICS INC: "Semi-persistent scheduling in NR", 3GPP DRAFT; R2-1704496 SEMI-PERSISTENT SCHEDULING IN NR, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE</p> <p>, vol. RAN WG2, no. Hangzhou, China; 20170515 - 20170519 14 May 2017 (2017-05-14), XP051275059, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/Meetings_3GPP_SYNC/RAN2/Docs/ [retrieved on 2017-05-14] * the whole document *</p> <p>-----</p>	1-13,15	<p>TECHNICAL FIELDS SEARCHED (IPC)</p>
X	<p>VIVO: "UL grant-free transmission", 3GPP DRAFT; R2-1705305_UL GRANT-FREE TRANSMISSION, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE</p> <p>, vol. RAN WG2, no. Hangzhou, China; 20170515 - 20170519 6 May 2017 (2017-05-06), XP051264828, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_98/Docs/ [retrieved on 2017-05-06] * the whole document *</p> <p>-----</p>	14	
The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>26 February 2024</b>	Examiner <b>Christopoulou, K</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p>		<p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... &amp; : member of the same patent family, corresponding document</p>	

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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

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Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

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No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

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**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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**see sheet B**

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All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

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As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

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Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

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None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
**EP 23 19 0954**

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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**1. claims: 1-13, 15**

**"Handling collision of uplink transmissions"**

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**2. claim: 14**

**"Performing a retransmission after expiration of a timer"**

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-02-2024

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	<b>WO 2017052706 A1</b>	<b>30-03-2017</b>	<b>CN 107926016 A</b>	<b>17-04-2018</b>
			<b>HK 1252891 A1</b>	<b>06-06-2019</b>
15			<b>TW 201724883 A</b>	<b>01-07-2017</b>
			<b>US 2018242389 A1</b>	<b>23-08-2018</b>
			<b>WO 2017052706 A1</b>	<b>30-03-2017</b>
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82