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Reference PN841910EP	Application No./Patent No. 21173524.6 - 1205
Applicant/Proprietor Samsung Electronics Co., Ltd.	

Communication

The extended European search report is enclosed.

The extended European search report includes, pursuant to Rule 62 EPC, the European search report (R. 61 EPC) or the partial European search report/ declaration of no search (R. 63 EPC) and the European search opinion.

Copies of documents cited in the European search report are attached.

0 additional set(s) of copies of such documents is (are) enclosed as well.

The following have been approved:

Abstract Title

The Abstract was modified and the definitive text is attached to this communication.

The following figure(s) will be published together with the abstract: 26

Refund of search fee

If applicable under Article 9 Rules relating to fees, a separate communication from the Receiving Section on the refund of the search fee will be sent later.

Should you wish to further prosecute this application in the examination phase, your attention is drawn to the provisions of Rule 70a EPC. An invitation to respond to the extended European search report will be issued once the date of publication of the European search report has been mentioned in the European Patent Bulletin (R. 69(1), R. 70(2) EPC).



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	CN 108 702 375 A (WILUS INST STANDARDS & TECH INC; SK TELECOM CO LTD) 23 October 2018 (2018-10-23) * paragraph [0094] - paragraph [0238] *	1-15	INV. H04L5/00 H04W72/04
X,P	& US 2020/267654 A1 (SON JUHYUNG [KR] ET AL) 20 August 2020 (2020-08-20) * paragraph [0094] - paragraph [0238] *	1-15	
X	WO 2020/013594 A1 (LG ELECTRONICS INC) 16 January 2020 (2020-01-16) * paragraph [0020] *	1-15	
E	& US 2021/176643 A1 (JANG INSUN [KR] ET AL) 10 June 2021 (2021-06-10) * paragraph [0020] *	1-15	
X	WO 2020/019928 A1 (HUAWEI TECHNOLOGIES CO LTD) 30 January 2020 (2020-01-30) * paragraph [0025] - paragraph [0123] *	1-15	
E	& US 2021/143966 A1 (YU JIAN [CN] ET AL) 13 May 2021 (2021-05-13) * paragraph [0025] - paragraph [0123] *	1-15	
X	US 2020/015219 A1 (ASTERJADHI ALFRED [US] ET AL) 9 January 2020 (2020-01-09) * paragraph [0024] - paragraph [0095] *	1,2	
X	US 2019/124556 A1 (VERMA LOCHAN [US] ET AL) 25 April 2019 (2019-04-25) * paragraph [0030] - paragraph [0080] *	1,3-15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			H04L H04W
1	Place of search	Date of completion of the search	Examiner
	The Hague	5 October 2021	Dupuis, Hervé
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention	
X : particularly relevant if taken alone		E : earlier patent document, but published on, or after the filing date	
Y : particularly relevant if combined with another document of the same category		D : document cited in the application	
A : technological background		L : document cited for other reasons	
O : non-written disclosure		
P : intermediate document		& : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (P04C01)

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

EP 21 17 3524

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
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05-10-2021

Patent document cited in search report		Publication date	Patent family member(s)	Publication date	
CN 108702375	A	23-10-2018	CN 108702375	A	23-10-2018
			EP 3396925	A2	31-10-2018
			EP 3849157	A1	14-07-2021
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			US 2019124556	A1	25-04-2019
			WO 2019079592	A1	25-04-2019

The examination is being carried out on the **following application documents**

Description, Pages

1-36 as originally filed

Claims, Numbers

1-15 as originally filed

Drawings, Sheets

1/51-51/51 as originally filed

1 **Documents**

1.1 Reference is made to the following document; the numbering will be adhered to in the rest of the procedure:

D1a US 2020/267654 A1 (SON JUHYUNG [KR] ET AL) 20 August 2020 (2020-08-20)

D1 CN 108 702 375 A (WILUS INST STANDARDS & TECH INC; SK TELECOM CO LTD) 23 October 2018 (2018-10-23)

D2a US 2021/176643 A1 (JANG INSUN [KR] ET AL) 10 June 2021 (2021-06-10)

D2 WO 2020/013594 A1 (LG ELECTRONICS INC) 16 January 2020 (2020-01-16)

D3a US 2021/143966 A1 (YU JIAN [CN] ET AL) 13 May 2021 (2021-05-13)

D3 WO 2020/019928 A1 (HUAWEI TECHNOLOGIES CO LTD) 30 January 2020 (2020-01-30)

D4 US 2020/015219 A1 (ASTERJADHI ALFRED [US] ET AL) 9 January 2020 (2020-01-09)

D5 US 2019/124556 A1 (VERMA LOCHAN [US] ET AL) 25 April 2019 (2019-04-25)

- 1.2 Document D1a is considered as a translation of D1.
- 1.3 Document D2a is considered as a translation of D2.
- 1.4 Document D3a is considered as a translation of D3.

2 **Clarity and Conciseness (Art. 84 EPC)**

- 2.1 The application does not meet the requirements of Article 84 EPC, because the claims are not clear.
- 2.2 The "association" indicated by the word "associated" in the expression "at least seven bits associated with the at least one RU" is vague. They refer only to having some kind of association such as being used in a same system. It is however essential from the description that the at least seven bits define at partially the at least one RU. Since independent claim 1 does not contain this feature it does not meet the requirement following from Article 84 EPC, taken in combination with Rule 43(1) and (3) EPC, that any independent claim must contain all the technical features essential to the definition of the invention.
- 2.3 In claim 1 it is not clear whether "second device" of line 1 and line 5 is the same and whether the one of line 10 is the first or the second "second device". It is suggested to indicate "bandwidth to the second device" in line 5.
- 2.4 In claim 3 some alternatives do not show the terms introduced by "the (such as "second 26-tone RU" and "second 52-tone RU", which therefore lack antecedent, see e.g. the first alternative of claim 3:

"The method of claim 1 or claim 2, wherein the allocating of the at least one RU comprises, when the bandwidth is 20 MHz in which **first to ninth 26-tone RUs** are sequentially arrangeable, allocating a multi-RU comprising a 52-tone RU and a 26-tone RU to the second device, and wherein the multi-RU comprises a **first multi-RU comprising the second 52-tone RU and the second 26-tone RU**".

In claim 3 it is also not clear whether "in which" refers to be "in the bandwidth of 20 MHz" or to "in the method" in the expression "when the bandwidth is 20 MHz in which **first to ninth 26-tone RUs** are sequentially arrangeable"; it is further unclear how the 20MHz b itself cannot be "in which **first to ninth 26-tone RUs** are sequentially arrangeable". It is a band, and it does not depend on what flows within. Rather, there may be feature of the devices concerning whether they are configured to perform communication in a certain way in this bandwidth.

Corresponding objections apply to the other claims.

2.5 In claim 11 "unallocated" should be corrected.

3 **Novelty and Inventive Step (Art. 52(1), 54 and 56 EPC)**

3.1 The present application does not meet the requirements of Article 52(1) EPC because the subject-matter of claims 1-15 is not new and is not inventive within the meaning of Article 54(1) and (2) EPC and Article 56 EPC.

3.2 D1 discloses (the references pointing to D1a)

a method of communicating, by a first device, with at least one second device in a wireless local area network, hereinafter referred to as WLAN, system, the method comprising:

(paragraph 94, 5th sentence, "Upon receiving the trigger frame from the AP, a plurality of STAs transmit uplink data through each allocated channel (or, subchannel) in response thereto",

1st device: AP,

2nd device: STA)

- allocating at least one resource unit, hereinafter referred to as RU, within a bandwidth to a second device;

(paragraph 114, "More specifically, the resource unit allocation (RA) field of HE-SIG-B contains information on the resource unit partition type in a specific bandwidth (e.g., 20 MHz) of the frequency domain. Further, information of a STA assigned to each partitioned resource unit may be transmitted through the user specific field of the HE-SIG-B. The user specific field includes one or more user fields corresponding to each partitioned resource unit")

- generating at least one subfield defining the at least one RU;

(paragraph 114, "resource unit allocation (RA) field")

- generating a trigger frame comprising a user information field comprising the at least one subfield; and

(paragraph 180, last 5 sentences, "The scheduling information is obtained from a trigger frame included in the A-MPDU or a UL MU response scheduling field included in a MAC header of a specific MPDU constituting the A-MPDU. Also, the uplink response transmitted by the STAs includes uplink ACK, uplink data, and the like. According to an embodiment of the present invention, the scheduling information, that is, the resource units through which the STAs perform the UL MU response may be indicated

via a separate resource unit allocation (RA) field.FIG. 23(d) illustrates an embodiment in which resource units for uplink transmission are assigned through the separate RA field")

- transmitting a physical protocol layer data unit, hereinafter referred to as PPDU, comprising the trigger frame to the at least one second device,

(paragraph 180, 3rd sentence, "A-MPDU of the received DL MU PPDU")

wherein the generating comprises setting at least seven bits associated with the at least one RU and

(paragraph 205, first 3 sentences, "As shown in FIG. 27(a), when the total bandwidth through which a PPDU is transmitted is 80 MHz, two RA fields are transmitted in each HE-SIG-B content channel. That is, the first RA field (i.e., 8 bits) of the HE-SIG-B content channel 1 signals resource unit allocation information of channel A, and the second RA field (i.e., 8 bits) of the HE-SIG-B content channel 1 signals resource unit allocation information of channel C. Similarly, the first RA field (i.e., 8 bits) of the HE-SIG-B content channel 2 signals resource unit allocation information of channel B, and the second RA field (i.e., 8 bits) of the HE-SIG-B content channel 2 signals resource unit allocation information of channel D")

setting at least two bits as a value defining a subband that includes the at least one RU when the bandwidth includes at least four subbands.

(paragraph 218, 4th sentence, "In this case, the bandwidth field of the HE-SIG-A may indicate information about at least which channel each of the HE-SIG-B content channels of the corresponding PPDU is transmitted through";

paragraph 220, "According to the embodiment of the present invention, the non-contiguous channel allocation information may be indicated via any one of subfield(s) of the HE-SIG-A, subfield(s) of the HE-SIG-B, and a combination thereof";

paragraph 222, last 2 sentences, "Thus, when the non-contiguous channel allocation is performed, the SIG-B compression field 454 may be used for other purposes.For example, the HE-SIG-A may indicate non-contiguous channel allocation information using both the bandwidth field 452 and the SIG-B compression field",

noting that this field has more than two bits;

paragraphs 223-224, "Next, the non-contiguous channel allocation information may be signaled solely via subfield(s) of the HE-SIG-B. In this case, the bandwidth field of the HE-SIG-A indicates the existing contiguous bandwidths, and information of the unassigned channel (or unassigned resource unit) may be indicated via the RA field 432 and/or the user field of the HE-SIG-B. In this case, the signaling overhead of the HE-SIG-A may be reduced, but the signaling overhead of the HE-SIG-B may increase. Finally, the non-contiguous channel allocation information may be signaled via a combination of subfield(s) of the HE-SIG-A and subfield(s) of the HE-SIG-B. The subfield(s) of the HE-SIG-A may signal at least a portion of the non-contiguous channel allocation information, and the subfield(s) of the HE-SIG-B may signal the remaining information",

paragraph 227, "The bandwidth field of the HE-SIG-A may basically index information of four contiguous channels 510, that is, 20 MHz, 40 MHz, 80 MHz and 160 MHz (including 80+80 MHz), respectively. When the bandwidth field consists of 3 bits, the bandwidth field may index information of four additional non-contiguous channels 520. First, the bandwidth field may index each puncturing of one of two 20 MHz channels in the S40 channel. In addition, the bandwidth field may index whether the S80 channel is allocated, in combination with the configuration of the S40 channel. Therefore, the bandwidth field may index four non-contiguous channel configurations in total by combining two configurations of P40+S40A and P40+S40B in the P80 channel and two configurations according to whether the S80 channel is allocated",

precisely 2 bits in paragraph 238: "First, the location information X of the HE-SIG-B content channel may indicate a channel through which the HE-SIG-B content channel 2 is transmitted within the P80 channel. When the location information consists of 2 bits, it may indicate a total of four channels, that is, P20, S20, S40A and S40B. When the location information consists of 1 bit, it may indicate a total of two channels, that is, S20 and S40B. In the latter case, even when only the P20 channel is assigned to a user, it can be signaled that the HE-SIG-B content channel is transmitted through the S20 channel. However, since no signal is actually transmitted through the S20 channel and the receiver would fail to decode the HE-SIG-B content channel on the S20 channel, there is no problem in a PPDU transmission configured only on the P20 channel",

see also paragraphs 258-261)

3.3 D2 discloses (the references pointing to D2a)

a method of communicating, by a first device, with at least one second device in a wireless local area network, hereinafter referred to as WLAN, system, the method comprising:

(paragraph 123, "FIG. 9 illustrates an example of a trigger frame. The trigger frame of FIG. 9 allocates resources for Uplink Multiple-User (MU) transmission and may be transmitted from the AP. The trigger frame may be configured as a MAC frame and may be included in the PPDU. For example, the trigger frame may be transmitted through the PPDU shown in FIG. 3, through the legacy PPDU shown in FIG. 2, or through a certain PPDU, which is newly designed for the corresponding trigger frame. In case the trigger frame is transmitted through the PPDU of FIG. 3, the trigger frame may be included in the data field shown in the drawing";

1st device: AP;

2nd device: recipient of PPDU with trigger frame)

- allocating at least one resource unit, hereinafter referred to as RU, within a bandwidth to a second device;

(paragraph 127, "The per user information field may be referred to as an "RU allocation field"");

paragraph 139, "In this case, it is preferable that the RU indicated by the RU Allocation field (1120) indicates the RUs shown in FIGS. 4, 5, and 6")

- generating at least one subfield defining the at least one RU;

(paragraph 139, "In this case, it is preferable that the RU indicated by the RU Allocation field (1120) indicates the RUs shown in FIGS. 4, 5, and 6")

- generating a trigger frame comprising a user information field comprising the at least one subfield; and

(paragraphs 138-139 locate the RU field in the user information of a trigger frame)

- transmitting a physical protocol layer data unit, hereinafter referred to as PPDU, comprising the trigger frame to the at least one second device,

(paragraph 123)

wherein the generating comprises setting at least seven bits associated with the at least one RU and

(table 9, two lines just after the big horizontal line, "8-bit RU Allocation subfield")

setting at least two bits as a value defining a subband that includes the at least one RU when the bandwidth includes at least four subbands.

(only one bit in paragraph 194, "1 bit is added to RU allocation subfield of User Info field (total 9 bits): To support secondary 160 Hz as a channel in which an allocated RU is located.->Indication information using B13B12 in which 1 bit is added as shown Table 15 is required due to secondary 160 MHz. In addition, since 3x996-tone and 4x996-tone RU cases are required due to the adding of 240/320 MHz, indication information shall be set as shown in Table 16 by using a reserved bit";

two bits: B13B12 shown in Fig.18 and paragraph 218, last sentence, "The value of the RU allocation subfield shown in FIG. 18 is one example in which the value is set based on Table 15 and Table 16 above")

3.4 D3 discloses (the references pointing to D3a)

a method of communicating, by a first device, with at least one second device in a wireless local area network, hereinafter referred to as WLAN, system, the method comprising:

(paragraph 25, 1st sentence, "an AP sends a PPDU to a plurality of STAs, where the PPDU includes M trigger frames";

1st device: AP;

2nd device: one of the STAs)

- allocating at least one resource unit, hereinafter referred to as RU, within a bandwidth to a second device;

(paragraph 25, last sentence, "the first field is used to indicate an RU allocated by the AP to at least one of the plurality of STAs")

- generating at least one subfield defining the at least one RU;

(paragraph 25, last sentence, "the first field is used to indicate an RU allocated by the AP to at least one of the plurality of STAs")

- generating a trigger frame comprising a user information field comprising the at least one subfield; and

(paragraph 25, 1st sentence, "an AP sends a PPDU to a plurality of STAs, where the PPDU includes M trigger frames";

paragraph 81, penultimate sentence, "In addition, the per STA field has 1 to M STA fields in a resource unit allocation order")

- transmitting a physical protocol layer data unit, hereinafter referred to as PDU, comprising the trigger frame to the at least one second device,

(paragraph 25, last sentence, "the first field is used to indicate an RU allocated by the AP to at least one of the plurality of STAs")

wherein the generating comprises setting at least seven bits associated with the at least one RU and

(paragraph 123, "Optionally, lengths of the first value, the second value, the third value, the fourth value, the fifth value, the sixth value, the seventh value, the eighth value, the ninth value, the tenth value, and the eleventh value are all 8 bits. In other words, the resource unit allocation subfield may be 8 bits")

setting at least two bits as a value defining a subband that includes the at least one RU when the bandwidth includes at least four subbands.

(eleventh value referring to four parts in Table 3, defining each as subband)

(two bits for subband: coding of CC)

3.5 D4 discloses

a method of communicating, by a first device, with at least one second device in a wireless local area network, hereinafter referred to as WLAN, system, the method comprising:

(paragraph 95, 1st sentence, "At 605, an AP 105-b may transmit a trigger frame to one or more STAs, including an STA 115-b to coordinate uplink transmission")

- allocating at least one resource unit, hereinafter referred to as RU, within a bandwidth to a second device;

- generating at least one subfield defining the at least one RU;

- generating a trigger frame comprising a user information field comprising the at least one subfield; and

- transmitting a physical protocol layer data unit, hereinafter referred to as PDU, comprising the trigger frame to the at least one second device,

(paragraph 95, 3rd sentence, "The one or more subfields of the trigger frame include information such as a payload length, bandwidth, RU allocation, and modulation scheme, as well as one or more request indications for reporting by the receiving STA 115-b")

wherein the generating comprises setting at least seven bits associated with the at least one RU and

(paragraph 121, 2nd sentence, "The RU allocation subfield may include an available channel bitmap, spanning 8 bits, encoded for indication of the RU of the HE TB PPDU for the receiving STA")

setting at least two bits as a value defining a subband that includes the at least one RU when the bandwidth includes at least four subbands.

(paragraph 91, 2nd sentence, "That is, EHT supported STAs may repurpose available reserved bits of the OM control subfield to indicate a different encoding scheme for the channel width subfield",

paragraph 104, 2nd sentence, "each bit field of the 8 bit channel bitmap for the control information subfield may represent a sub-channel allocation of 40 MHz",

paragraph 54, 2nd sentence, "The BQR indication may include an available channel bitmap for indication of which sub-channels of the operating bandwidth are available at the STA.", implying at least two bits)

3.6 The subject-matter of claim 1 is not inventive in view of D5 which discloses a method of communicating, by a first device, with at least one second device in a wireless local area network, hereinafter referred to as WLAN, system, the method comprising:

(paragraph 30, 1st sentence, "To trigger uplink transmissions from one or more STAs of different generations, the AP may transmit a trigger frame";

1st device: AP;

2nd device: STA)

- allocating at least one resource unit, hereinafter referred to as RU, within a bandwidth to a second device;

(paragraph 80, 3rd sentence, "The AP may include resource unit (RU) allocations in the trigger frame")

- generating at least one subfield defining the at least one RU;

- generating a trigger frame comprising a user information field comprising the at least one subfield; and

(paragraph 31, 5th sentence, "In yet some other implementations, the AP may order the RU allocations in the trigger frame in increasing order. An EHT STA may parse the user information for multiple STAs")

- transmitting a physical protocol layer data unit, hereinafter referred to as PDU, comprising the trigger frame to the at least one second device,

(paragraph 43, 2nd sentence, "AP 105-b may transmit trigger frame 310 using an HE physical layer convergence procedure (PLCP) protocol data unit (PDU) format")

wherein the generating comprises setting at least seven bits associated with the at least one RU and

(paragraph 56, 5th sentence, "an 8-bit RU allocation field 550",

paragraph 57, 8th sentence, "The remaining seven bits of the RU allocation field 550 may indicate RUs allocated to the STA",

also paragraph 58,

also paragraph 59, 3rd sentence, "additional bit",

also paragraph 60, penultimate sentence, "For example, an AID included in an AID 12 field 545 may be decreased to 11 bits to support the extra bit included in the redefined RU allocation field 550")

3.6.1 The difference is "setting at least two bits as a value defining a subband that includes the at least one RU when the bandwidth includes at least four subbands".

3.6.2 This difference lacks an inventive step in view of:

(paragraph 80, last sentence, "The AP may include an additional indication in the trigger frame for EHT STAs, so that the EHT STAs may identify the bandwidth to use",

1 bit: paragraph 57, 7th sentence, "A first bit, B, of the eight total bits in the RU allocation field 550 may indicate to the STA that its assignment of RUs is located in a primary 80 MHz segment or a secondary MHz segment";

also 1 bit, but in reserved field, same as in the present application, also attacking inventive step, paragraph 57, last sentence, "one reserved bit in the user info field 530-a is used to indicate whether this STA is allocated resources in a primary 160 MHz segment or a secondary 160 MHz segment")

3.7 The subject-matter of claim 1 is therefore not new (Article 54(1) and (2) EPC) and not inventive (Article 56 EPC).

3.8 Dependent claims 2-15 do not appear to contain any additional features which, in combination with the features of any claim to which it refers, meet the requirements of the EPC with respect to novelty and/or inventive step:

- claim 2: uplink bandwidth field disclosed in D2, see D2a, paragraph 20, "The common information field may include information on an uplink bandwidth at which the data is transmitted", and paragraph 21 with 3 bits, "he information on the uplink bandwidth may consist of 3 bits", and

not inventive in front of D4, paragraph 24, "an uplink bandwidth", which shows in paragraph 116 2 bits, "an UL BW subfield spanning 2 bits",

- claim 3, 1st alternative, i.e. "The method of claim 1 or claim 2, wherein the allocating of the at least one RU comprises, when the bandwidth is 20 MHz in which **first to ninth 26-tone RUs** are sequentially arrangeable, allocating a multi-RU comprising a 52-tone RU and a 26-tone RU to the second device, and wherein the multi-RU comprises **a first multi-RU comprising the second 52-tone RU and the second 26-tone RU.**",

see D1, paragraph 117, 6th-7th sentences, "More specifically, the PPDU format may signal, via HE-SIG-B, a transmission which uses a part of the resource units of the data area transmitted on the basis of 256 FFT/20 MHz. Therefore, transmission using only 26-tone RU, 52-tone RU, or 106-tone RU which is less than 20 MHz band can be performed even in an uplink/downlink single-user transmission situation",

see D2a, paragraph 157, 1st sentence, "five 26-tone RUs are arranged next to one 106-tone RU",

see D5, paragraph 61 and table 1,

- claim 3, other alternatives, not inventive with respect to this first alternative as disclosed in D1 and D2,

- claims 4-15 not inventive with respect to claim 3 first alternative as disclosed in D1 and D2.

4 **Further Objections**

4.1 Independent claim 1 is not in the two-part form in accordance with Rule 43(1) EPC.

4.2 The features of the claims should be provided with reference signs placed in parentheses to increase the intelligibility of the claims (Rule 43(7) EPC). This applies to both the preamble and characterising portion (see Guidelines F-IV, 4.18).

4.3 To meet the requirements of Rule 42(1)(b) EPC, the above cited documents should be identified in the description and the relevant background art disclosed therein should be briefly discussed.

5 **Procedure**

5.1 The applicant is invited to file a new (independent) claim which takes account of the above comments.

5.2 In order to comply with the requirements of Rule 137(4) EPC, the applicant should clearly identify the amendments made, irrespective of whether they concern amendments by addition, replacement or deletion, and indicate the passages of the application as filed on which these amendments are based (see Guidelines H III, 2.1).

If the applicant considers it appropriate, these indications could be submitted in handwritten form on a copy of the relevant parts of the application as filed or in documents with tracked changes.

5.3 Amendments should be made by filing replacement pages. Unnecessary recasting of the description should be avoided. An amended abstract is not required. The applicant should also take account of the requirements of Rule 50(1) EPC. According to Rule 50(1) in conjunction with Rule 49(8) EPC, amendments shall be typed or printed. Handwritten amendments may only be made in documents other than those replacing application documents (Rule 50(2) EPC); they may, for example, be used to fulfil the requirements of Rule 137(4) EPC (identifying amendments and indicating basis for them).