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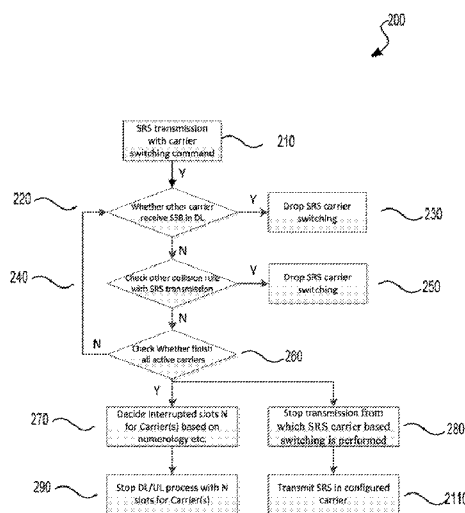
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(54) Title: METHODS AND APPARATUS OF INTERRUPTION AT SRS CARRIER SWITCHING IN NEW RADIO SYSTEM

**FIG. 2**

(57) **Abstract:** This invention proposes a mechanism of SRS carrier switching procedure in a wireless communication network. The method includes a scheduling searching to check whether SSB receiving on other carriers happens at the same time. The method will decide how many slots UE will interrupt for each carriers DL/UL based on a searching table or real decision system based on the numerology of victim carrier(s) and aggressor carrier. Meanwhile, the UL TA, CA or synchronization/asynchronization DC deployment, intra-band or inter-band cells/carriers deployment will possible result in different interruption slot for victim cell(s) /carrier(s).



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METHODS AND APPARATUS OF INTERRUPTION AT SRS CARRIER SWITCHING IN NEW RADIO SYSTEM

TECHNICAL FIELD

[0001]The present disclosure relates to wireless communications, and particularly relates to SRS carrier switching processing in a New Radio system.

BACKGROUND

[0002]The background description provided herein is for the purpose of generally presenting the context of the disclosure. Work of the presently named inventors, to the extent the work is described in this background section, as well as aspects of the description that may not otherwise qualify as prior art at the time of filing, are neither expressly nor impliedly admitted as prior art against the present disclosure.

[0003]The 5G New Radio (NR) system is designed to transmit SRS in the last several symbols in one slot. A UE with fewer UL CCs than DL CCs in TDD can use SRS CC switching to sound on possibly all CCs, thus providing the network with more accurate CSI on those CCs for better beamforming in DL. The SRS transmission with carrier switching will possibly impact other active carriers' transmission/receiving process based on the RF design.

[0004]The RF switching time in Frequency Range 1 (FR1) and Frequency Range 2 (FR2) should consider intra-band and inter-band. For switching between carriers in the same band, the candidate values are 0us, 30us, 100us, 140us and 200us depending on UE capability; for switching between carriers/aggregated carriers in different bands, the candidate values of 0us, 30us, 100us, 140us, 200us, 300us, 500us and 900us depending on UE capability.

[0005]The 5G New Radio (NR) system is designed to make use of SSB (Synchronization Signal Block) to execute the cell identification, measurement and beam management etc.. Considering the importance for SSB receiving in DL, there is collision rule for UE to handle when antenna switching SRS transmission colliding with SSB. The SSB is periodical transmission based on its SMTC (SSB Based RRM Measurement Timing Configuration) periodicity. SMTC periodicity is one of the values among {5, 10, 20, 40, 80, 160}ms.

[0006]Accordingly, it is important for the UE to properly handle the SRS transmission with carrier switching based on above configuration.

SUMMARY

[0007]Aspects of the disclosure provide a method for process SRS carrier switching procedure in a wireless communication network. The method includes a scheduling searching to check whether SSB receiving on other carriers happens at the same time. The method will decide how many slots UE will interrupt for each carriers DL/UL based on a searching table or real decision system based on the numerology of victim carrier(s) and aggressor carrier. Meanwhile, the UL TA or asynchronization DC will possibly result in additional interruption slot for victim cell/carrier.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008]Various embodiments of this disclosure that are proposed as examples will be described in detail

with reference to the following figures, wherein like numerals reference like elements, and wherein:

[0009]Fig. 1 shows a wireless communication system according to an embodiment of the disclosure;

[0010]Fig. 2 shows an example of UE process procedure when receiving configured SRS carrier switching according to an embodiment of the disclosure;

5 [0011]Fig. 3 to Fig. 10 show different examples of interruption slots for different numerology according to embodiments of the disclosure;

[0012]Fig. 11 shows an exemplary block diagram of a user equipment (UE) according to an embodiment of the disclosure.

10 DETAILED DESCRIPTION OF EMBODIMENTS

[0013]Fig. 1 shows a wireless communication system 100 according to an embodiment of the disclosure. The system 100 can include a user equipment (UE) 110 and a base station (BS) 120. The system 100 can be a cellular network, and employ the New Radio (NR) technologies and the LTE technologies developed by the 3rd Generation Partnership Project (3GPP) for wireless communications between the UE 110 and the BS 120.

15 The UE 110 can be a mobile phone, a laptop computer, a device carried in a vehicle, and the like. The BS 120 can be an implementation of a gNB specified in NR standards. Accordingly, the UE 110 can communicate with the base station 120 through a wireless communication channel according to communication protocols specified in respective communication standards. Please note that the invention is not limited by this.

[0014]In one example, the UE 110 and the base station 120 are configured to employ carrier aggregation (CA). UE could support MCG 130. Accordingly, MCG 130 can be configured between the UE 110 and the base station 120. UE can deploy PCell 131 and SCell 1(132)-SCell N(133) in MCG 130. At the same time, when UE can also deploy dual-connection (DC) technique with SCG 140. UE can deploy PSCell 141 and SCell 1(142)-SCell N(143) in MCG 140 based on UE's capability.

[0015]Fig. 2 shows an example of UE process procedure when receiving configured SRS carrier switching 200. In step 210, UE receives the higher layer signaling to configure SRS transmission on a carrier without PUCCH/PUSCH transmission configured by carrier switching command. In step 220, the UE will check whether at least one carrier will receive SSB at the same time with SRS carrier switching. If yes, step 230, the UE will drop the SRS carrier switching at this slot.

[0016]Alternatively, in step 230, the UE will only drop the SRS symbols which collide with SSB and 30 transmit other SRS symbols.

[0017]In step 240, the UE will check other collision rules for SRS transmission. If SRS transmission has lower priority than other signals' process, step 250, the UE will drop the SRS carrier switching at this slot.

[0018]In step 260, the UE will check whether all active carriers are finished. If not finished all active carriers, the UE will continue the process from step 220.

35 [0019]If yes, in step 270, the UE will decide how many slots will be interrupted in each active carrier(s) based on the numerology, UL TA time, CA or DC, synchronization or asynchronization DC etc. parameters.

[0020]In step 280, the UE will stop PUSCH/PUCCH transmission from which SRS carrier based switching is performed.

[0021]In step 290, the UE will stop transmission for N slots in active carrier(s).

40 [0022]In step 2110, the UE will transmit SRS on the carrier without PUCCH/PUSCH transmission

configured.

[0023] Fig. 3 shows an example 300 of victim cells for different numerology with aggressor cell's sub-carrier spacing(SCS)=15khz. The SRS transmission process time 310 includes 2*RF switching time plus the SRS transmission time in aggressor cell. The interruption length starting from slot #n but end in slot #n+1.

5 [0024] The RF switching time is 200us in this example, but it could be other numbers in the list below {0us, 30us, 100us, 140us, 200us, 300us, 500us, 900us}. The interrupted slots number could be different.

[0025] In one embodiment, the victim cell SCS=15khz, the interrupted slot will be slot #n and slot #n+1. In another embodiment, the victim cell SCS=30khz, the interrupted slot will be slot #n, slot #n+1, and slot #n+2. In another embodiment, the victim cell SCS=60khz, the interrupted slot will be from slot #n+1 to slot #n+4. In yet another embodiment, the victim cell SCS=120khz, the interrupted slot will be from slot #n+2, to slot #n+9.

10 [0026] Alternatively, the UE will have the same interrupted slots number in victim cell(s) for aggressor cell with SCS=15khz in DC scenario.

[0027] Alternatively, the victim cell which is not in the same frequency range with aggressor cell will have no interruption when UE supports per-FR gap capability.

15 [0028] Fig. 4 shows an example 400 of victim cells for different numerology with aggressor cell's sub-carrier spacing(SCS)=15khz and uplink(UL) time advance(TA) in aggressor cell. The SRS transmission process time 410 includes 2*RF switching time plus the SRS transmission time in aggressor cell. The interruption length starting from slot #n and end in slot #n because of UL TA.

[0029] The RF switching time is 200us in this example, but it could be other numbers in the list below {0us, 30us, 100us, 140us, 200us, 300us, 500us, 900us}. The interrupted slots number could be different.

[0030] In one embodiment, the victim cell SCS=15khz, the interrupted slot will be slot #n. In another embodiment, the victim cell SCS=30khz, the interrupted slot will be slot #n and slot #n+1. In another embodiment, the victim cell SCS=60khz, the interrupted slot will be from slot #n to slot #n+3. In yet another embodiment, the victim cell SCS=120khz, the interrupted slot will be from slot #n+1, to slot #n+7.

25 [0031] Alternatively, the UE will have the same interrupted slots number in victim cell(s) for aggressor cell with SCS=15khz in asynchronization DC scenario.

[0032] Alternatively, the victim cell which is not in the same frequency range with aggressor cell will have no interruption when UE supports per-FR gap capability.

30 [0033] Fig. 5 shows an example 500 of victim cells for different numerology with aggressor cell's sub-carrier spacing(SCS)=30khz. The SRS transmission process time 510 includes 2*RF switching time plus the SRS transmission time in aggressor cell. The interruption length starting from slot #n+1 but end in slot #n+2.

[0034] The RF switching time is 200us in this example, but it could be other numbers in the list below {0us, 30us, 100us, 140us, 200us, 300us, 500us, 900us}. The interrupted slots number could be different.

35 [0035] In one embodiment, the victim cell SCS=15khz, the interrupted slot will be slot #n and slot #n+1. In another embodiment, the victim cell SCS=30khz, the interrupted slot will be slot #n+1, and slot #n+2. In another embodiment, the victim cell SCS=60khz, the interrupted slot will be slot #n+2, #n+3 and slot #n+4. In yet another embodiment, the victim cell SCS=120khz, the interrupted slot will be from slot #n+4, to slot #n+9.

[0036] Alternatively, the UE will have the same interrupted slots number in victim cell(s) for aggressor cell with SCS=30khz in DC scenario.

40 [0037] Alternatively, the victim cell which is not in the same frequency range with aggressor cell will have

no interruption when UE supports per-FR gap capability.

[0038] Fig. 6 shows an example 600 of victim cells for different numerology with aggressor cell's sub-carrier spacing(SCS)=30khz and uplink(UL) time advance(TA) in aggressor cell. The SRS transmission process time 610 includes 2*RF switching time plus the SRS transmission time in aggressor cell. The interruption length starting from slot #n and end in slot #n+1 because of UL TA.

[0039] The RF switching time is 200us in this example, but it could be other numbers in the list below {0us, 30us, 100us, 140us, 200us, 300us, 500us, 900us}. The interrupted slots number could be different.

[0040] In one embodiment, the victim cell SCS=15khz, the interrupted slot will be slot #n and slot #n+1. In another embodiment, the victim cell SCS=30khz, the interrupted slot will be slot #n, slot #n+1, and slot #n+2. In another embodiment, the victim cell SCS=60khz, the interrupted slot will be from slot #n+1, to slot #n+4. In yet another embodiment, the victim cell SCS=120khz, the interrupted slot will be from slot #n+3, to slot #n+8.

[0041] Alternatively, the UE will have the same interrupted slots number in victim cell(s) for aggressor cell with SCS=30khz in asynchronization DC scenario.

[0042] Alternatively, the victim cell which is not in the same frequency range with aggressor cell will have no interruption when UE supports per-FR gap capability.

[0043] Fig. 7 shows an example 700 of victim cells for different numerology with aggressor cell's sub-carrier spacing(SCS)=60khz. The SRS transmission process time 710 includes 2*RF switching time plus the SRS transmission time in aggressor cell. The interruption length starting from slot #n+2 but end in slot #n+4.

[0044] The RF switching time is 200us in this example, but it could be other numbers in the list below {0us, 30us, 100us, 140us, 200us, 300us, 500us, 900us}. The interrupted slots number could be different.

[0045] In one embodiment, the victim cell SCS=15khz, the interrupted slot will be slot #n and slot #n+1. In another embodiment, the victim cell SCS=30khz, the interrupted slot will be slot #n+1, and slot #n+2. In another embodiment, the victim cell SCS=60khz, the interrupted slot will be slot #n+2, slot #n+3 and slot #n+4. In yet another embodiment, the victim cell SCS=120khz, the interrupted slot will be from slot #n+5 to slot #n+9.

[0046] Alternatively, the UE will have the same interrupted slots number in victim cell(s) for aggressor cell with SCS=60khz in DC scenario.

[0047] Alternatively, the victim cell which is not in the same frequency range with aggressor cell will have no interruption when UE supports per-FR gap capability.

[0048] Fig. 8 shows an example 800 of victim cells for different numerology with aggressor cell's sub-carrier spacing(SCS)=60khz and uplink(UL) time advance(TA) in aggressor cell. The SRS transmission process time 810 includes 2*RF switching time plus the SRS transmission time in aggressor cell. The interruption length starting from slot #n+2 and end in slot #n+4 because of UL TA.

[0049] The RF switching time is 200us in this example, but it could be other numbers in the list below {0us, 30us, 100us, 140us, 200us, 300us, 500us, 900us}. The interrupted slots number could be different.

[0050] In one embodiment, the victim cell SCS=15khz, the interrupted slot will be slot #n and slot #n+1. In another embodiment, the victim cell SCS=30khz, the interrupted slot will be slot #n, slot #n+1, and slot #n+2. In another embodiment, the victim cell SCS=60khz, the interrupted slot will be from slot #n+1, to slot #n+4. In yet another embodiment, the victim cell SCS=120khz, the interrupted slot will be from slot #n+3, to

slot #n+8.

[0051]Alternatively, the UE will have the same interrupted slots number in victim cell(s) for aggressor cell with SCS=60khz in asynchronization DC scenario.

[0052]Alternatively, the victim cell which is not in the same frequency range with aggressor cell will have no interruption when UE supports per-FR gap capability.

[0053]Fig. 9 shows an example 900 of victim cells for different numerology with aggressor cell's sub-carrier spacing(SCS)=120khz. The SRS transmission process time 910 includes 2*RF switching time plus the SRS transmission time in aggressor cell. The interruption length starting from slot #n+5 but end in slot #n+9.

[0054]The RF switching time is 200us in this example, but it could be other numbers in the list below {0us, 30us, 100us, 140us, 200us, 300us, 500us, 900us}. The interrupted slots number could be different.

[0055]In one embodiment, the victim cell SCS=15khz, the interrupted slot will be slot #n and slot #n+1. In another embodiment, the victim cell SCS=30khz, the interrupted slot will be slot #n+1, and slot #n+2. In another embodiment, the victim cell SCS=60khz, the interrupted slot will be from slot #n+2 to slot #n+4. In yet another embodiment, the victim cell SCS=120khz, the interrupted slot will be from slot #n+5 to slot #n+9.

[0056]Alternatively, the UE will have the same interrupted slots number in victim cell(s) for aggressor cell with SCS=120khz in DC scenario.

[0057]Alternatively, the victim cell which is not in the same frequency range with aggressor cell will have no interruption when UE supports per-FR gap capability.

[0058]Fig. 10 shows an example 1000 of victim cells for different numerology with aggressor cell's sub-carrier spacing(SCS)=120khz and uplink(UL) time advance(TA) in aggressor cell. The SRS transmission process time 1010 includes 2*RF switching time plus the SRS transmission time in aggressor cell. The interruption length starting from slot #n+4 and end in slot #n+7 because of UL TA.

[0059]The RF switching time is 200us in this example, but it could be other numbers in the list below {0us, 30us, 100us, 140us, 200us, 300us, 500us, 900us}. The interrupted slots number could be different.

[0060]In one embodiment, the victim cell SCS=15khz, the interrupted slot will be slot #n and slot #n+1. In another embodiment, the victim cell SCS=30khz, the interrupted slot will be slot #n+1, and slot #n+2. In another embodiment, the victim cell SCS=60khz, the interrupted slot will be from slot #n+2 to slot #n+4. In yet another embodiment, the victim cell SCS=120khz, the interrupted slot will be from slot #n+5 to slot #n+9.

[0061]Alternatively, the UE will have the same interrupted slots number in victim cell(s) for aggressor cell with SCS=120khz in asynchronization DC scenario.

[0062]Alternatively, the victim cell which is not in the same frequency range with aggressor cell will have no interruption when UE supports per-FR gap capability.

[0063]Fig. 11 shows an exemplary block diagram of a UE 1100 according to an embodiment of the disclosure. The UE 1100 can be configured to implement various embodiments of the disclosure described herein. The UE 1100 can include a processor 1110, a memory 1120, and a radio frequency (RF) module 1130 that are coupled together as shown in Fig. 11. In different examples, the UE 1100 can be a mobile phone, a tablet computer, a desktop computer, a vehicle carried device, and the like.

[0064]The processor 1110 can be configured to perform various functions of the UE 120 described above with reference to Fig. 1- Fig.10. The processor 1110 can include signal processing circuitry to process received or to be transmitted data according to communication protocols specified in, for example, LTE and

NR standards. Additionally, the processor 1110 may execute program instructions, for example, stored in the memory 1120, to perform functions related with different communication protocols. The processor 1110 can be implemented with suitable hardware, software, or a combination thereof. For example, the processor 1110 can be implemented with application specific integrated circuits (ASIC), field programmable gate arrays (FPGA), and the like, that includes circuitry. The circuitry can be configured to perform various functions of the processor 1110.

[0065] In one example, the memory 1120 can store program instructions that, when executed by the processor 1110, cause the processor 1110 to perform various functions as described herein. The memory 1120 can include a read only memory (ROM), a random access memory (RAM), a flash memory, a solid state memory, a hard disk drive, and the like.

[0066] The RF module 1130 can be configured to receive a digital signal from the processor 1110 and accordingly transmit a signal to a base station in a wireless communication network via an antenna 1140. In addition, the RF module 1130 can be configured to receive a wireless signal from a base station and accordingly generate a digital signal which is provided to the processor 1110. The RF module 1130 can include digital to analog/analog to digital converters (DAC/ADC), frequency down/up converters, filters, and amplifiers for reception and transmission operations. For example, the RF module 1130 can include converter circuits, filter circuits, amplification circuits, and the like, for processing signals on different carriers or bandwidth parts.

[0067] The UE 1100 can optionally include other components, such as input and output devices, additional CPU or signal processing circuitry, and the like. Accordingly, the UE 1100 may be capable of performing other additional functions, such as executing application programs, and processing alternative communication protocols.

[0068] The processes and functions described herein can be implemented as a computer program which, when executed by one or more processors, can cause the one or more processors to perform the respective processes and functions. The computer program may be stored or distributed on a suitable medium, such as an optical storage medium or a solid-state medium supplied together with, or as part of, other hardware. The computer program may also be distributed in other forms, such as via the Internet or other wired or wireless telecommunication systems. For example, the computer program can be obtained and loaded into an apparatus, including obtaining the computer program through physical medium or distributed system, including, for example, from a server connected to the Internet.

[0069] The computer program may be accessible from a computer-readable medium providing program instructions for use by or in connection with a computer or any instruction execution system. A computer readable medium may include any apparatus that stores, communicates, propagates, or transports the computer program for use by or in connection with an instruction execution system, apparatus, or device. The computer-readable medium can be magnetic, optical, electronic, electromagnetic, infrared, or semiconductor system (or apparatus or device) or a propagation medium. The computer-readable medium may include a computer-readable non-transitory storage medium such as a semiconductor or solid state memory, magnetic tape, a removable computer diskette, a random access memory (RAM), a read-only memory (ROM), a magnetic disk and an optical disk, and the like. The computer-readable non-transitory storage medium can include all types of computer readable medium, including magnetic storage medium, optical storage medium, flash medium and

solid state storage medium.

[0070]While aspects of the present disclosure have been described in conjunction with the specific embodiments thereof that are proposed as examples, alternatives, modifications, and variations to the examples may be made. Accordingly, embodiments as set forth herein are intended to be illustrative and not limiting.

5 There are changes that may be made without departing from the scope of the claims set forth below.

CLAIMS

1. A method, comprising:

When UE is configured with SRS carrier switching by RRC signaling,

scheduling searching to check whether SSB receiving happens at the same time in other active

5 carrier(s)/cell(s); and

deciding how many slots UE will interrupt for each carriers DL/UL based on a searching table or UE's capability signaling or real decision system for the numerology of victim carrier(s)/cell(s) and aggressor carrier/cell.

2. The method of claim 1, further comprising:

10 deciding drop SRS transmission mechanism by detect the collision with SSB receiving at the same time in the active carrier(s)/cell(s).

3. The method of claim 1, further comprising:

scheduling the victim carrier(s)/cell(s) which impacted by the SRS transmission aggressor carrier/cell.

4. The method of claim 1, further comprising:

15 The UE victim carrier(s)/cell(s) will be interrupted based on the numerology of victim carrier(s)/cell(s) and aggressor carrier/cell.

5. The method of claim 1, further comprising:

The UE victim carrier(s) will be interrupted based on the intra-band or inter-band carrier(s)/cell(s) deployment.

20 6. The method of claim 3, further comprising:

When the UE is in CA or DC deployment, and the aggressor carrier with SRS transmission's SCS is 15KHz;

The victim carrier(s) of SCS=15KHz will interrupt 2 slots;

The victim carrier(s) of SCS=30KHz will interrupt 3 slots;

25 The victim carrier(s) of SCS=60KHz will interrupt 4 slots;

The victim carrier(s) of SCS=120KHz will interrupt 8 slots.

7. The method of claim 3, further comprising:

When the UE is in CA with UL TA or DC deployment with UL TA or asynchronization DC, and the aggressor carrier with SRS transmission's SCS is 15KHz;

30 When SRS transmission length and RF retuning length all base on one aggressor carrier slot,

The victim carrier(s) of SCS=15KHz will interrupt 1 slots;

The victim carrier(s) of SCS=30KHz will interrupt 2 slots;

The victim carrier(s) of SCS=60KHz will interrupt 4 slots;

The victim carrier(s) of SCS=120KHz will interrupt 7 slots.

35 8. The method of claim 3, further comprising:

When the UE is in CA or DC deployment, and the aggressor carrier with SRS transmission's SCS is 30KHz;

The victim carrier(s) of SCS=15KHz will interrupt 2 slots;

The victim carrier(s) of SCS=30KHz will interrupt 2 slots;

The victim carrier(s) of SCS=60KHz will interrupt 3 slots;

The victim carrier(s) of SCS=120KHz will interrupt 6 slots.

9.The method of claim 3, further comprising:

When the UE is in CA with UL TA or DC deployment with UL TA or asynchronization DC, and the
5 aggressor carrier with SRS transmission's SCS is 30KHz;

When SRS transmission length and RF retuning length all base on one aggressor carrier slot,

The victim carrier(s) of SCS=15KHz will interrupt 1 slots;

The victim carrier(s) of SCS=30KHz will interrupt 2 slots;

The victim carrier(s) of SCS=60KHz will interrupt 3 slots;

10 The victim carrier(s) of SCS=120KHz will interrupt 5 slots.

10.The method of claim 3, further comprising:

When the UE is in CA or DC deployment, and the aggressor carrier with SRS transmission's SCS is
60KHz;

The victim carrier(s) of SCS=15KHz will interrupt 2 slots;

15 The victim carrier(s) of SCS=30KHz will interrupt 2 slots;

The victim carrier(s) of SCS=60KHz will interrupt 3 slots;

The victim carrier(s) of SCS=120KHz will interrupt 5 slots.

11.The method of claim 3, further comprising:

When the UE is in CA with UL TA or DC deployment with UL TA or asynchronization DC, and the
20 aggressor carrier with SRS transmission's SCS is 60KHz;

When SRS transmission length and RF retuning length all base on one aggressor carrier slot,

The victim carrier(s) of SCS=15KHz will interrupt 1 slots;

The victim carrier(s) of SCS=30KHz will interrupt 2 slots;

The victim carrier(s) of SCS=60KHz will interrupt 3 slots;

25 The victim carrier(s) of SCS=120KHz will interrupt 5 slots.

12.The method of claim 3, further comprising:

When the UE is in CA or DC deployment, and the aggressor carrier with SRS transmission's SCS is
120KHz;

The victim carrier(s) of SCS=15KHz will interrupt 2 slots;

30 The victim carrier(s) of SCS=30KHz will interrupt 2 slots;

The victim carrier(s) of SCS=60KHz will interrupt 3 slots;

The victim carrier(s) of SCS=120KHz will interrupt 5 slots.

13.The method of claim 3, further comprising:

When the UE is in CA with UL TA or DC deployment with UL TA or asynchronization DC, and the
35 aggressor carrier with SRS transmission's SCS is 60KHz;

When SRS transmission length and RF retuning length all base on one aggressor carrier slot,

The victim carrier(s) of SCS=15KHz will interrupt 1 slots;

The victim carrier(s) of SCS=30KHz will interrupt 1 slots;

The victim carrier(s) of SCS=60KHz will interrupt 2 slots;

The victim carrier(s) of SCS=120KHz will interrupt 4 slots.

14. The method of claim 3, further comprising:

When UE support per-FR gap, the interruption on the SRS transmission with antenna switching in the victim cell(s) will only be caused by the aggressor cell in the same FR.

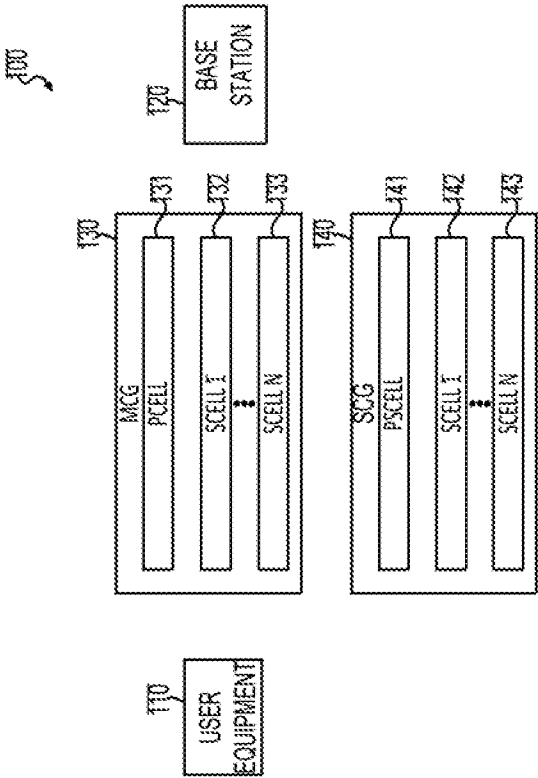
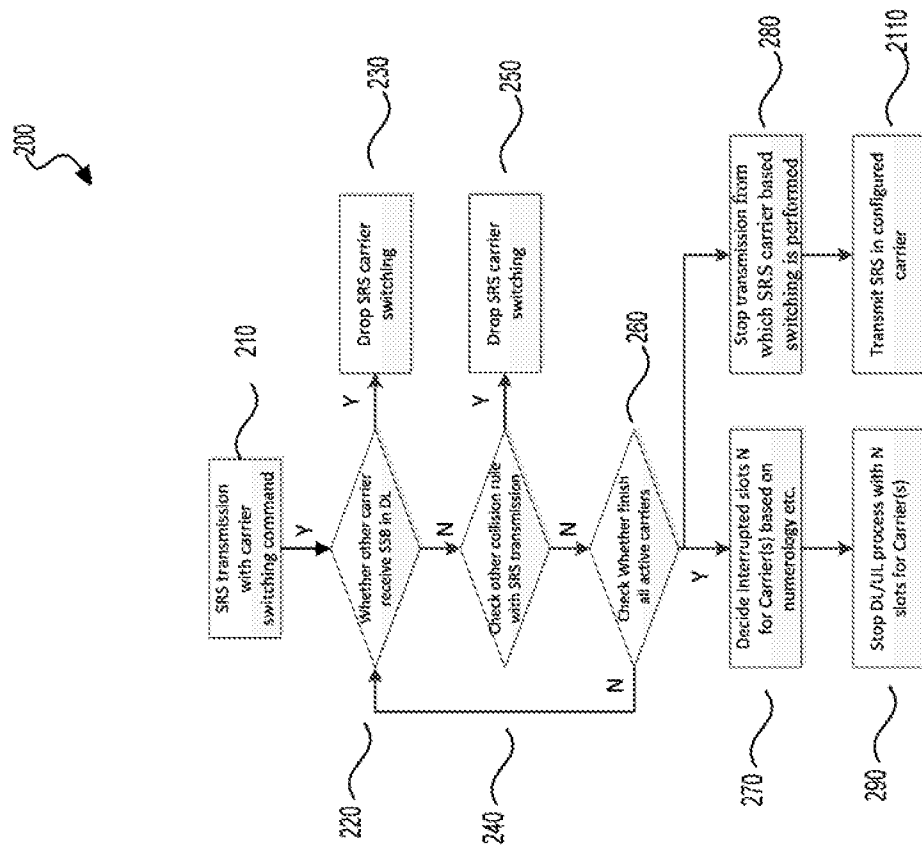


FIG. 1

**FIG. 2**

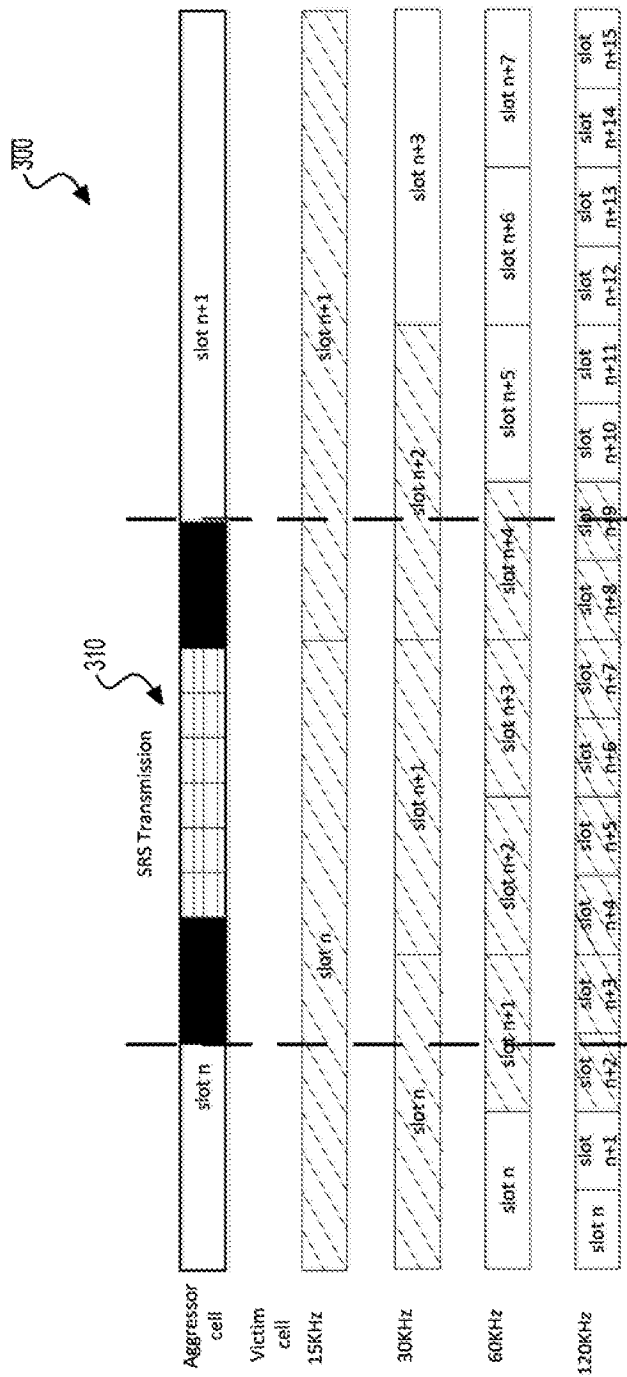


FIG. 3

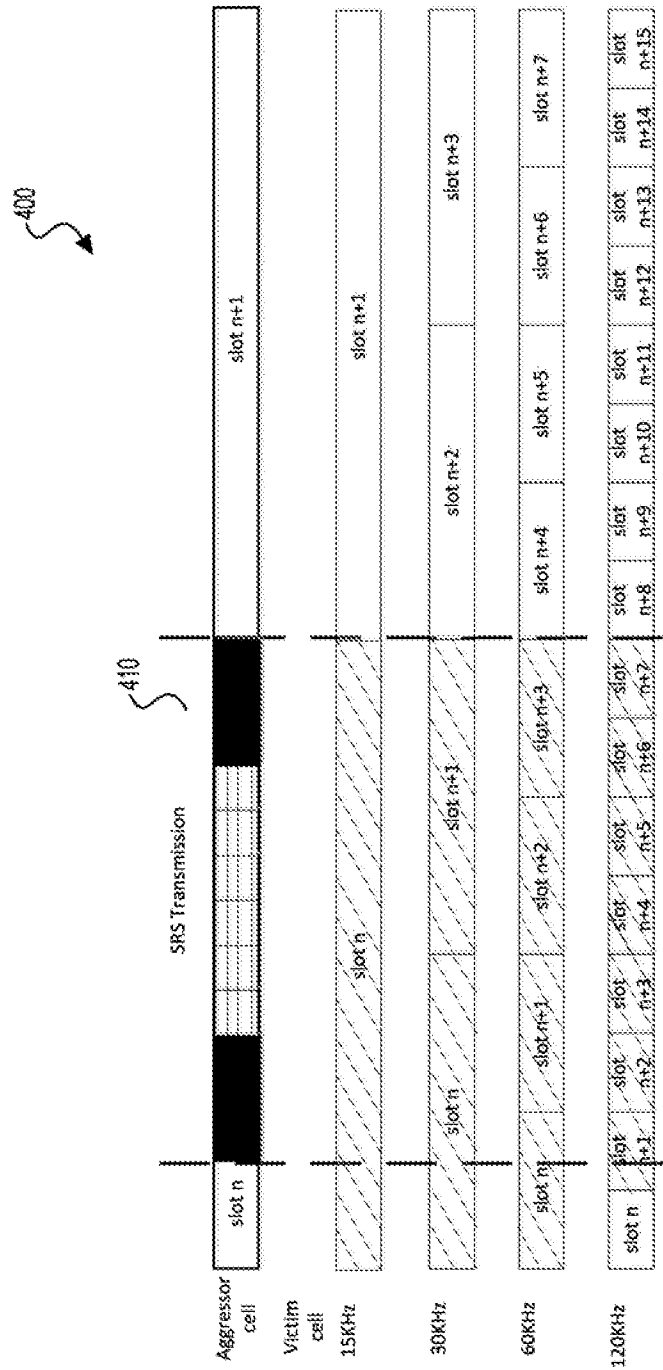


FIG. 4

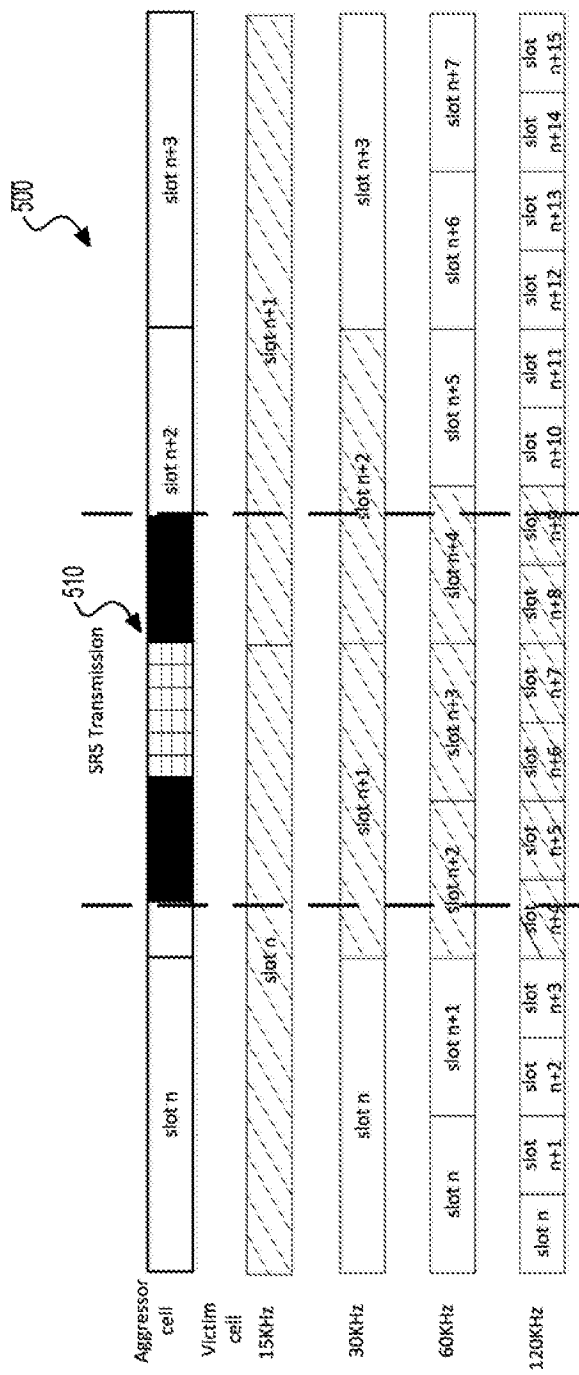


FIG. 5

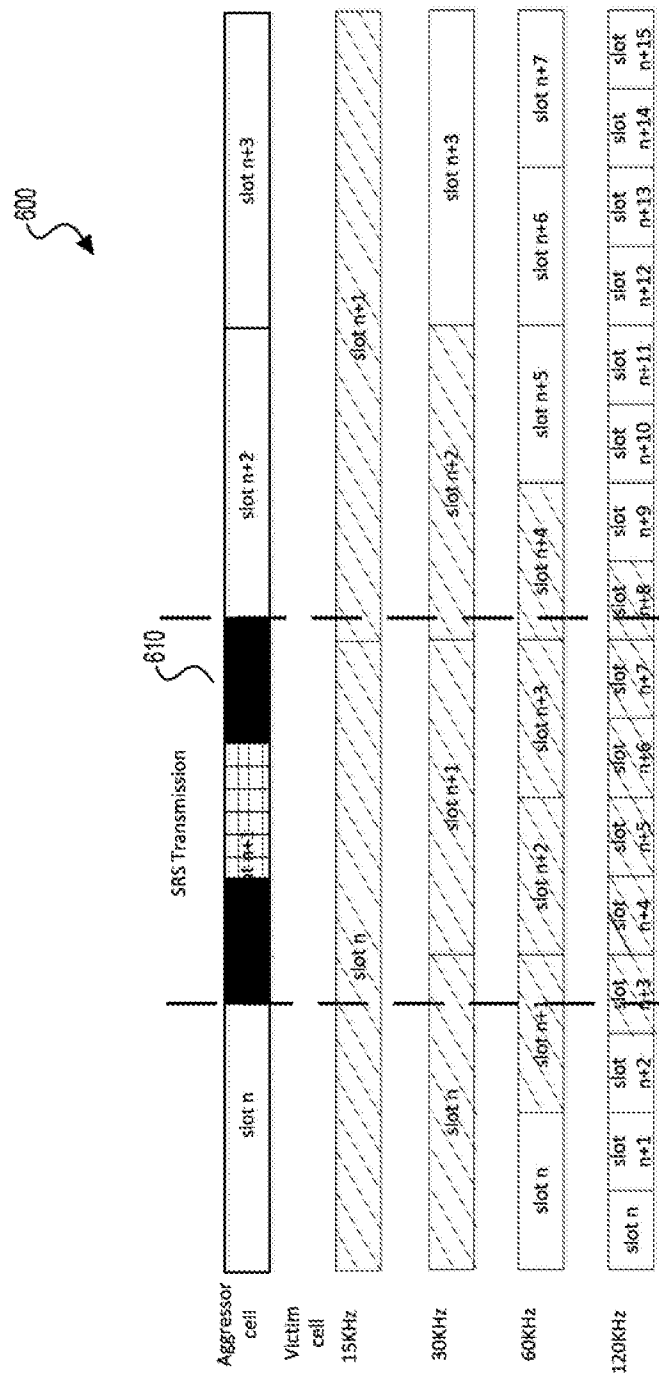


FIG. 6

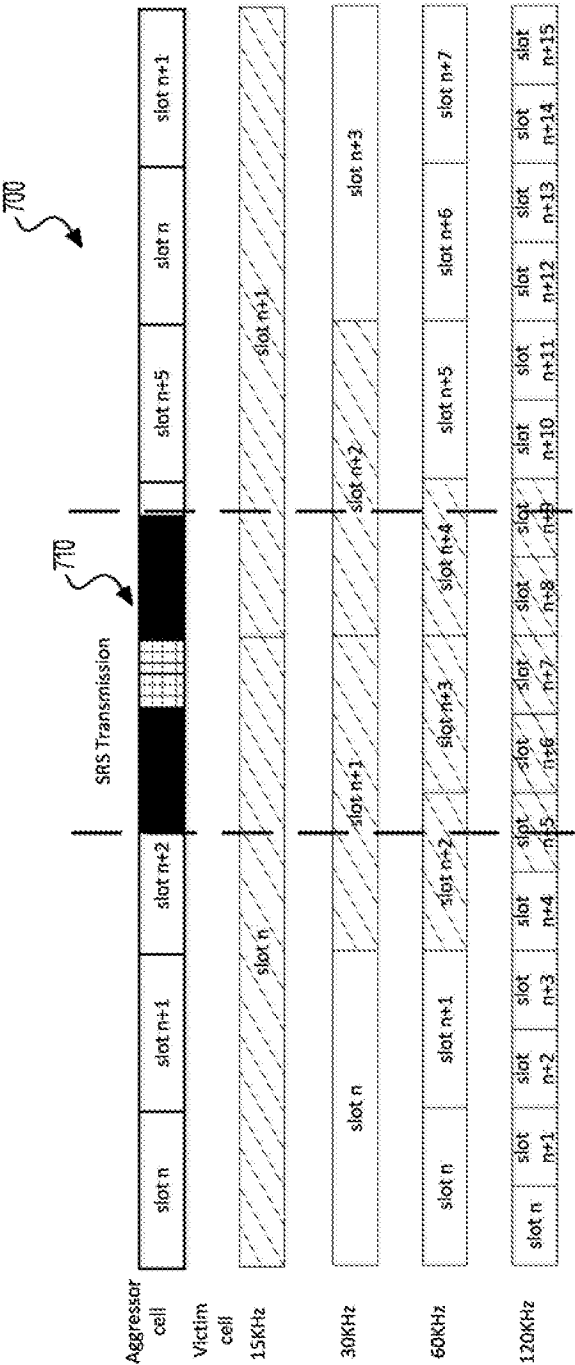


FIG. 7

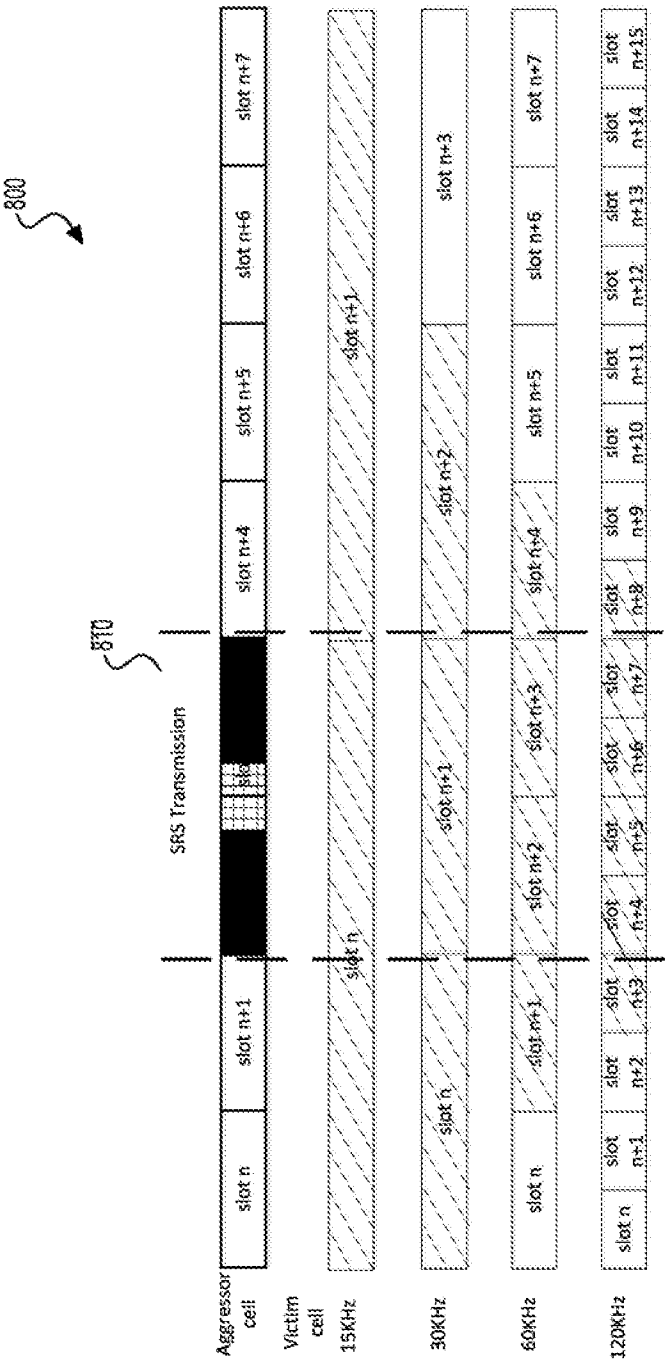


FIG. 8

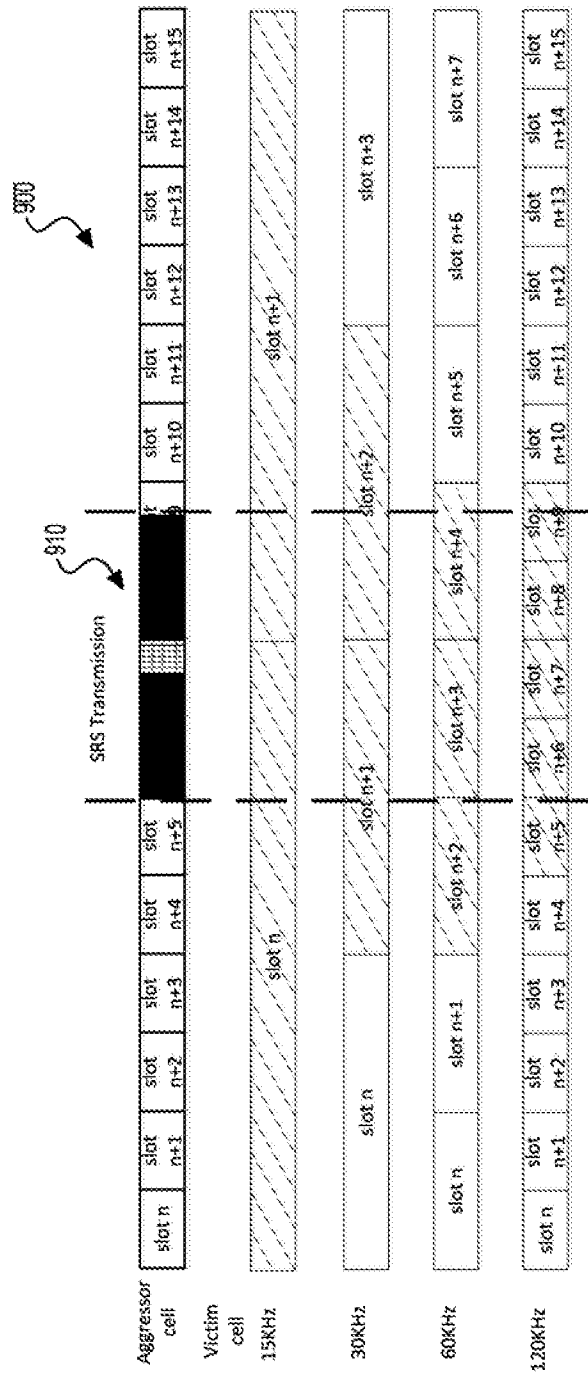


FIG. 9

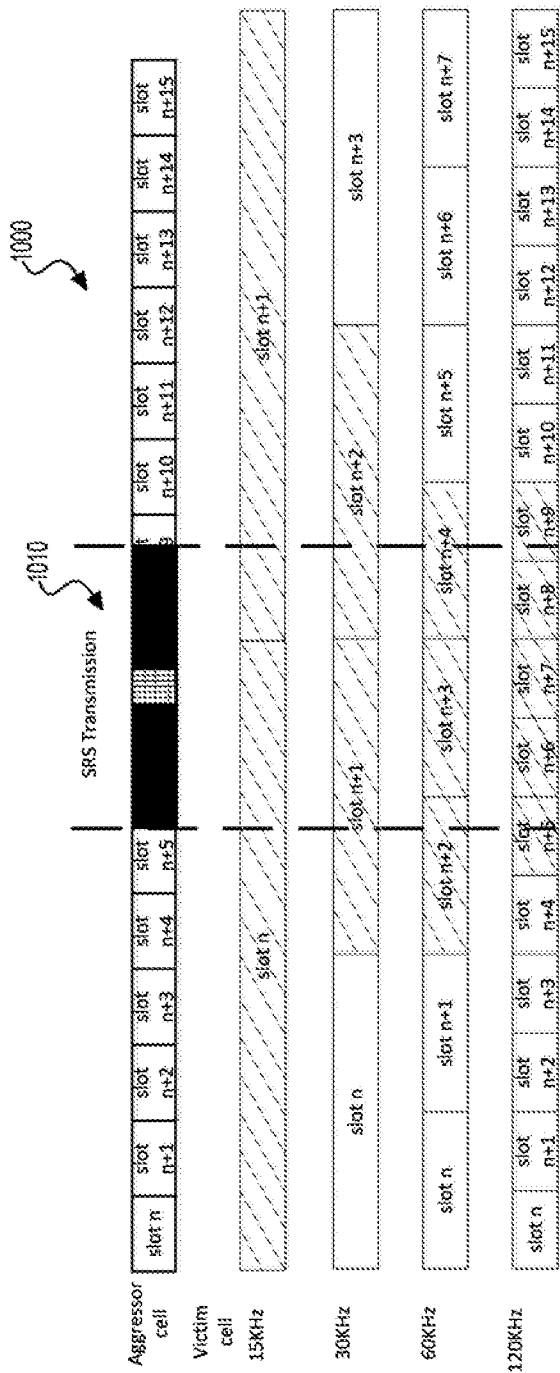


FIG. 10

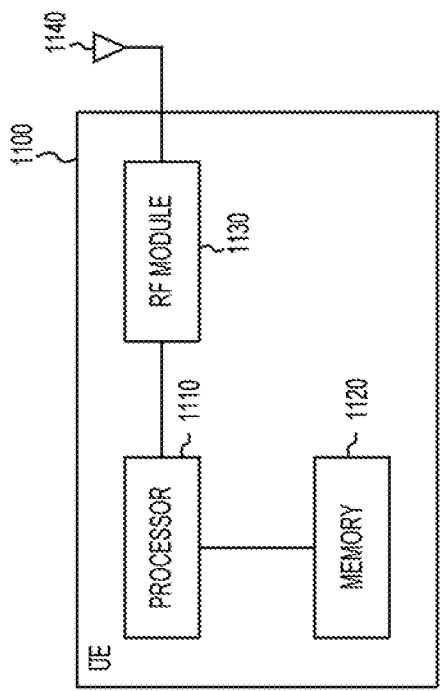


FIG. 11

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/075174

A. CLASSIFICATION OF SUBJECT MATTER

H04W 72/04(2009.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H04W; H04Q; H04L

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

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

VEN,CPRSABS,USTXT,WOTXT,EPTXT,CNXT,CNKI,3GPP:SRS,SSB,PBCH,SSS,PSS,carrier,collide,conflict,interrupt, slot, number,victim,cell,same,time

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Huawei, HiSilicon. "Feature lead summary of remaining issues for RS multiplexing" 3GPP TSG RAN WG1 Meeting #94, 12 October 2018 (2018-10-12), see description, pages 1-7	1-14
A	US 2018323855 A1 (SAMSUNG ELECTRONICS CO LTD) 08 November 2018 (2018-11-08) the whole document	1-14
A	WO 2018144916 A1 (NTT DOCOMO INC ET AL.) 09 August 2018 (2018-08-09) the whole document	1-14
A	Qualcomm Incorporated. "Summary of GC-PDCCH carrying SFI" 3GPP TSG RAN WG1 Meeting #94, 24 August 2018 (2018-08-24), the whole document	1-14

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

16 October 2019

Date of mailing of the international search report

08 November 2019

Name and mailing address of the ISA/CN

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Telephone No. 86-010-62411353

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2019/075174

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
US	2018323855	A1	08 November 2018	WO	2018203711	A1	08 November 2018
				KR	20180122958	A	14 November 2018
WO	2018144916	A1	09 August 2018	CN	110268637	A	20 September 2019