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专 利 合 作 条 约

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PCT

国际检索单位书面意见

(PCT细则43之二 .1)

发文日 (年/月/日)	2018年 10月 29日
申请人或代理人的档案号 IP180226	关于后续行为 见下面第2段
国际申请号 PCT/CN2018/099379	国际申请日 (年/月/日) 2018年 8月 8日
优先权日 (年/月/日) 2017年 8月 10日	
国际专利分类（IPC）或国家分类及IPC H04W 24/02(2009.01)i	
申请人 夏普株式会社 等	

1. 本意见包括关于下列各项标明的内容：

- [x] 第I栏 意见的基础
- [ ] 第II栏 优先权
- [ ] 第III栏 不做出关于新颖性、创造性和工业实用性的意见
- [ ] 第IV栏 缺乏发明的单一性
- [x] 第V栏 按照细则43之二.1(a)(i)关于新颖性、创造性或工业实用性的推断性声明；支持这种声明的引证和解释
- [ ] 第VI栏 某些引用的文件
- [ ] 第VII栏 国际申请中的某些缺陷
- [ ] 第VIII栏 对国际申请的某些意见

2. **后续行为**

如果提出初步审查要求书，本次意见将被视为国际初步审查单位(IPEA)的一次书面意见，除非申请人选择的国际初步审查单位非本机构，而且所选国际初步审查单位已按照细则66.1之二(b)通知国际局将不考虑国际检索单位的书面意见时例外。

如本书面意见被视为国际初步审查单位的书面意见，则请申请人在自PCT/ISA/220表发文日起3个月或自优先权日起22个月内（以后届满者为准）向国际初步审查单位提交书面答复并提交修改（如适用）。

进一步的选择参见PCT/ISA/220表。

ISA/CN的名称和邮寄地址	完成本意见的日期	受权官员
中华人民共和国国家知识产权局 中国北京市海淀区蓟门桥西土城路6号 100088 传真号 （86－10）62019451	2018年 10月 22日	文娟 电话号码 86-10-53961609

表 PCT/ISA/237（扉页）(2015年1月)

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国际检索单位书面意见

国际申请号
PCT/CN2018/099379

第I栏 意见的基础

1. 关于**语言**，本意见的制定基于：
   - [x] 国际申请提交时使用的语言。
   - [ ] 该国际申请的_____语言译文，为了国际检索的目的提供该种语言的译文(细则12.3(a)和23.1(b))。
2. [ ] 本意见的制定考虑了本单位许可或被通知的根据细则91所做出的**明显错误更正**（细则 43之二1（a））。
3. [ ] 关于在国际申请中公开的任何**核苷酸和/或氨基酸序列**，本意见是基于下列序列表做出的：
   a. [ ] 作为国际申请的一部分提交的：
      - [ ] 附件C/ST.25文本文件形式
      - [ ] 纸件或图形文件形式

   b. [ ] 根据细则13之三.1(a)仅为国际检索目的以附件C/ST.25文本文件形式与国际申请同时提交的：
   c. [ ] 仅为国际检索目的在国际申请日之后提交的：
      - [ ] 附件C/ST.25文本文件形式（细则13之三.1(a)）
      - [ ] 纸件或图形文件形式（细则13之三.1(b)和行政规程第713段）
4. [ ] 另外，在提交/提供了多个版本或副本的序列表的情况下，提供了关于随后提交的或附加的副本中的信息与申请时提交的作为申请一部分的序列表的信息相同或未超出申请时提交的申请中的信息范围（如适用）的所需声明。
5. 补充意见：

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第V栏 按细则43之二.1（a）（i）关于新颖性、创造性或工业实用性的推测性声明；支持这种声明的引证和解释

1. 声明

新颖性 (N)	权利要求	1-10	是
	权利要求	无	否
创造性 (IS)	权利要求	无	是
	权利要求	1-10	否
工业实用性 (IA)	权利要求	1-10	是
	权利要求	无	否

2. 引证和解释：

[1] 1.参考以下文献：

[2] D1: Further considerations for SCG SRB and RLF handling, 3GPP TSG-RAN WG2 NR Adhoc #2 R2-1706857 (29.06.2017)

[3] 2.新颖性和创造性：

[4] D1公开了SCG SRB和RFL处理的进一步考虑（参见正文第1-2节），具体公开了：UE可同时被配置分离的MCG SRB和SCG SRB；LTE-NR DC中，支持下述SgNB故障情形，包括如SgNB RLF、超过最大上行传输时间差、SgNB配置失败等，UE将向MeNB上报SCG故障信息（相应于检测到SCG失效）；基于Sg-NB故障，UE将进行如暂停直接的SCG SRB及暂停对MCG分离SRB的SCG传输，重置SCG-MAC等处理；提议：基于SCG故障，UE在上行和下行中继续使用MN支路。

[5] 权利要求1与D1的区别在于：MCG重复SRB通过SCG进行上行传输，SCG失效后被配置为通过MCG进行传输或触发MCG失效。因此，权利要求1-4符合PCT 33(2)。然而，分组重复、分组重复分离承载是本领域SRB传输中的常用传输方式，对于MCG重复传输配置上行传输采用MCG、SCG进行传输是本领域技术人员的具体常规选择。基于D1公开的内容，在SCG故障后，对于分组重复传输的信息通过MCG继续传输或触发MCG失效是本领域技术人员容易想到的具体常规设定。因此，权利要求1不符合PCT 33(3)。

[6] 权利要求2-4的附加特征或已被D1公开或属于本领域的常用技术手段，因而不符合PCT 33(3)。

[7] 权利要求5请求一种用户设备UE，执行根据权利要求1-4任一项所述方法。基于前述权利要求1-4评述，且该权利要求中包括的收发机、处理器和存储器均是本领域常用器件，因而，权利要求5符合PCT 33(2)，不符合PCT 33(3)。

[8] 权利要求6与D1的区别在于：MCG基站通过MCG重复SRB与UE通信，所述SRB通过SCG进行上行传输，SCG失效后被配置为通过MCG接收上行传输。因此，权利要求6-9符合PCT 33(2)。然而，分组重复、分组重复分离承载是本领域SRB传输中的常用传输方式，对于MCG重复传输配置上行传输采用MCG、SCG进行传输是本领域技术人员的具体常规选择。基于D1公开的内容，在SCG故障后，对于分组重复传输的信息通过MCG继续传输是本领域技术人员容易想到的具体常规设定。因此，权利要求6不符合PCT 33(3)。

[9] 权利要求7-9的附加特征或已被D1公开或属于本领域的常用技术手段，因而不符合PCT 33(3)。

[10] 权利要求10请求一种基站，执行根据权利要求6-9任一项所述方法。基于前述权利要求6-9评述，且该权利要求中包括的收发机、处理器和存储器均是本领域常用器件，因而，权利要求10符合PCT 33(2)，不符合PCT 33(3)。

[11] 3.工业实用性：

[12] 权利要求1-10符合PCT 33(4)。

证　明

本证明之附件是向本局提交的下列专利申请文件副本。

申　　请　　号：201710683129.0

申　请　类　型：发明专利

发明 创造 名称：用户设备、基站和相关方法

申　　请　　日：2017.08.10

申　　请　　人：夏普株式会社

发明人或设计人：肖芳英、刘仁茂

局长

申长雨

2018 年 09 月 03 日

DAINGEAN_0004163

2017106831290

IA176652

权 利 要 求 书

1. 一种用户设备 UE 中的方法，所述 UE 被配置有主小区组 MCG 重复信令无线承载 SRB，所述 MCG 重复 SRB 与主小区组 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输，所述方法包括：

检测到 SCG 失效；以及

将所述 MCG 重复 SRB 重配置为通过 MCG 进行上行传输，或触发 MCG 失效。

2. 根据权利要求 1 所述的方法，其中，所述 UE 还被配置有另一 MCG 重复 SRB，所述方法还包括，在检测到 SCG 失效之后：

将所述另一 MCG 重复 SRB 重配置为通过 MCG 进行上行传输。

3. 根据权利要求 1 所述的方法，还包括：

向基站报告 SCG 失效，

其中，向基站报告 SCG 失效包括：

利用重配置的 MCG 重复 SRB，通过 MCG 向基站发送 SCG 失效信息，或

利用 MCG SRB 通过公共控制信道 CCCH 向基站发送 SCG 失效信息。

4. 根据权利要求 1 所述的方法，还包括：

从基站接收指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输，

其中，所述重配置仅在所述指示信息指示在 SCG 失效时通过 MCG 进行上行传输的情况下执行。

5. 一种用户设备 UE，包括收发机、处理器和存储器，所述处理器存储所述处理器可执行的指令，使得所述 UE 执行根据权利要求 1-4 中任一项所述的方法。

6. 一种基站中的方法，所述基站是主小区组 MCG 基站，通过 MCG 重复信令无线承载 SRB 与用户设备 UE 通信，所述 MCG 重复 SRB 与 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输，所述方法包括：

从所述 UE 接收辅小区组 SCG 失效的报告；以及

将所述 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

7. 根据权利要求 6 所述的方法，其中，所述接收 SCG 失效的报告包括：

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利用重配置的 MCG 重复 SRB，通过 MCG 接收 SCG 失效信息，或

利用 MCG SRB 通过公共控制信道 CCCH 接收 SCG 失效信息。

8. 根据权利要求 6 所述的方法，其中，所述基站还通过另一 MCG 重复 SRB 与所述 UE 通信，所述方法还包括：

将所述另一 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

9. 根据权利要求 6 所述的方法，还包括：

向所述 UE 发送指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。

10. 一种基站，包括收发机、处理器和存储器，所述处理器存储所述处理器可执行的指令，使得所述基站执行根据权利要求 6-9 中任一项所述的方法。

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说　　明　　书

用户设备、基站和相关方法

技术领域

本公开涉及无线通信技术领域，更具体地，本公开涉及用户设备、基站和与辅小区组 SCG 失效相关的方法。

背景技术

2016 年 3 月，在第三代合作伙伴计划 (3rd Generation Partnership Project：3GPP) RAN#71 次全会上，NTT DOCOMO 提出了一个关于 5G 技术标准的新的研究项目（参见非专利文献：RP-160671：New SID Proposal：Study on New Radio Access Technology），并获批准。该研究项目的目的是开发一个新的无线（New Radio：NR）接入技术以满足 5G 的所有应用场景、需求和部署环境。NR 主要有三个应用场景：增强的移动宽带通信（Enhanced mobile broadband：eMBB）、大规模机器类通信（massive Machine type communication：mMTC）和超可靠低延迟通信（Ultra reliable and low latency communications：URLLC)。

在 2016 年 10 月召开的 3GPP RAN2 #96 次会议上达成为满足 URLLC 对可靠性的要求，对多连接（包括双连接）进行研究。所述多连接可以采用分组重复(也称为包重复)或连路选择等机制。在 2017 年 1 月召开的 3GPP NR AdHoc 会议上达成在 NR-PDCP 实体中支持用户面和数据面的分组重复功能，发送端 PDCP 实体功能支持分组重复，且接收端 PDCP 实体功能支持删除重复包。在 2017 年 6 月召开的 3GPP NR AdHoc 会议上达成在双连接场景下，主基站决定是否使用主小区组 MCG 重复信令无线承载 SRB 并通过主基站无线链路控制 RRC 信令配置 MCG 重复 SRB。此外，此次会议还达成在双连接场景中，对于 MCG 重复 SRB，通过 RRC 信令配置上行传输采用 MCG、辅小区组 SCG 还是在 MCG 和 SCG 采用重复传输方式传输。

期望解决在支持分组重复的双连接场景下的，当 RRC 信令为 MCG 重复 SRB 配置了上行传输采用 SCG，但发生 SCG 失效所涉及的问题。

发明内容

根据本公开的第一方面，提供了一种用户设备 UE 中的方法，所述 UE 被配置有主小区组 MCG 重复信令无线承载 SRB，所述 MCG 重复 SRB 与主小区组 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输，所述方法包括：检测到 SCG 失效；以及将所述 MCG 重复 SRB 重配置为通过 MCG 进行上行传输，或触发 MCG 失效。

在实施例中，所述 UE 还被配置有另一 MCG 重复 SRB，所述方法还包括，在检测到 SCG 失效之后：将所述另一 MCG 重复 SRB 重配置为通过 MCG 进行上行传输。

在实施例中，所述方法还包括：向基站报告 SCG 失效，其中，向基站报告 SCG 失效包括：利用重配置的 MCG 重复 SRB，通过 MCG 向基站发送 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 向基站发送 SCG 失效信息。

在实施例中，所述方法还包括：从基站接收指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输，其中，所述重配置仅在所述指示信息指示在 SCG 失效时通过 MCG 进行上行传输的情况下执行。

根据本公开的第二方面，提供了一种用户设备 UE，包括收发机、处理器和存储器，所述处理器存储所述处理器可执行的指令，使得所述 UE 执行根据上述第一方面所述的方法。

根据本公开的第三方面，提供了一种基站中的方法，所述基站是主小区组 MCG 基站，通过 MCG 重复信令无线承载 SRB 与用户设备 UE 通信，所述 MCG 重复 SRB 与 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输，所述方法包括：从所述 UE 接收辅小区组 SCG 失效的报告；以及将所述 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在实施例中，所述接收 SCG 失效的报告包括：利用重配置的 MCG 重复 SRB，通过 MCG 接收 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 接收 SCG 失效信息。

在实施例中，所述基站还通过另一 MCG 重复 SRB 与所述 UE 通信，所述方法还包括：将所述另一 MCG 重复 SRB 重配置为通过 MCG 接收上

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行传输。

在实施例中，所述方法还包括：向所述 UE 发送指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。

根据本公开的第四方面，提供了一种基站，包括收发机、处理器和存储器，所述处理器存储所述处理器可执行的指令，使得所述基站执行根据上述第三方面所述的方法。

附图说明

通过下文结合附图的详细描述，本公开的上述和其它特征将会变得更加明显，其中：

图 1 示出了 MCG 重复 SRB 数据传输的示意图；

图 2 示出了用户设备 UE 中协议架构的示意图；

图 3 示出了根据本公开实施例的用户设备中的方法的流程图；

图 4 示出了根据本公开实施例的用户设备的框图；

图 5 示出了根据本公开实施例的基站中的方法的流程图；

图 6 示出了根据本公开实施例的基站的框图。

具体实施方式

下面结合附图和具体实施方式对本公开进行详细阐述。应当注意，本公开不应局限于下文所述的具体实施方式。另外，为了简便起见，省略了对与本公开没有直接关联的公知技术的详细描述，以防止对本公开的理解造成混淆。

下面描述本公开涉及的部分术语，如未特别说明，本公开涉及的术语采用此处定义。本公开给出的术语在 NR、LTE 和 eLTE 中可能采用不同的命名方式，但本公开中采用统一的术语，在应用到具体的系统中时，可以替换为相应系统中采用的术语。

RRC：Radio Resource Control，无线资源控制。

PDCP：Packet Data Convergence Protocol，分组数据汇聚协议。在本公开中，如未特别说明，PDCP 可以表示 NR 或 LTE 或 eLTE 中的 PDCP。

RLC：Radio Link Control，无线链路控制。在本公开中，如未特别说明，RLC 可以表示 NR 或 LTE 或 eLTE 中的 RLC。RLC 实体的传输模式可

以配置为透传模式 TM、非确认模式 UM 或确认模式 AM 之一。

MAC：Medium Access Control，媒体访问控制。在本公开中，如未特别说明，MAC 可以表示 NR 或 LTE 或 eLTE 中的 MAC 实体。

CCCH：Common Control Channel，公共控制信道。

PDU：Protocol Data Unit，协议数据单元。

SDU：Service Data Unit，服务数据单元。

在本公开中，将从上层接收或发往上层的数据称为 SDU，将发往下层或从下层接收的数据称为 PDU。例如，PDCP 实体从上层接收的数据或发往上层的数据称为 PDCP SDU；PDCP 实体从 RLC 实体接收到的数据或发往 RLC 实体的数据称为 PDCP PDU（也就是 RLC SDU）。

主基站：Master eNB 或 Master gNB，记为 MeNB（对应 E-UTRAN 或 LTE 或 eLTE 的基站）或 MgNB（对应 5G-RAN 或 NR 的基站）。在双连接中，至少终止于处理 UE 与核心网间交互的控制节点移动管理实体（可记为 S1-MME）的 eNB；或者，至少终止于 NG-C 的 gNB，所述 NG-C 是 NG-RAN 和 5GC 的控制面接口。

辅基站：Secondary eNB 或 Secondary gNB，记为 SeNB（对应 E-UTRAN 或 LTE 或 eLTE 的基站）或 SgNB(对应 5G-RAN 或 NR 的基站)。在双连接中，不是主基站但为 UE 提供额外的无线资源的基站。

主小区：Primary Cell，PCell。工作在主频率上的小区，可以是 UE 在其上执行初始连接建立过程或发起连接重建过程或在切换过程中被指定为主小区的小区。本公开所述小区也可称为载波或光束集（a set of beam）。

主辅小区：Primary Secondary Cell，PSCell。在执行改变 SCG 的过程中指示 UE 用于执行随机接入的 SCG 小区。

辅小区：Secondary Cell，SCell。工作在辅频率上的小区，所述小区可在 RRC 连接建立之后配置且可用于提供额外的无线资源。

小区组：Cell Group ，CG，在双连接或多连接中，关联到主基站或辅基站的一组服务小区或载波。

主小区组：Master Cell Group，MCG。对于未配置双连接的 UE，MCG 由所有的服务小区组成；对于配置了双连接的 UE，MCG 由服务小区的子集组成（即关联到主基站的一组服务小区），其中包含 PCell 和 0 个或 1 个或多个 SCell。

辅小区组：Secondary Cell Group，SCG。在双连接中，与 SeNB 或 SgNB 关联的一组服务小区。SCG 可以包含一个 PSCell，还可以包含一个或多个 SCell。

双连接：在 NR 中，处于 RRC 连接态下 UE 的被配置为利用两个不同的调度器所提供的资源，所述两个调度器分别位于两个通过非理想回程（non-ideal backhaul）连接的基站。在 LTE/LTE-A/eLTE 中，处于 RRC 连接态的 UE 配置了一个 MCG 和一个 SCG；换言之，处于连接态的具有两个个接收机和/或发送机的 UE 被配置为使用由两个不同的调度器提供的 EUTRAN 无线资源，所述调度器可以通过非理想回程连接。双连接数据传输方式包括但不限于：数据重复，链路选择。所述链路选择传输方式是指同一数据或 PDCP PDU 或 PDCP SDU 在为 UE 配置的两个小区组或两个小区组提供的无线资源中的其中一个小区组发送。

DRB：Data Radio Bearer carrying user plane data，承载用户面数据的数据无线承载或简称数据承载。

分离 DRB：在双连接中，在 LTE/LTE-A/eLTE 中，无线协议位于主基站和辅基站且同时利用主基站和辅基站提供的资源的 DRB。如果分离 DRB 的 PDCP 实体位于主基站（即数据先到达主基站，由主基站转发给辅基站，实现数据在主基站中分离），则称为 MCG 分离 DRB；如果分离 DRB 的 PDCP 实体位于辅基站（即数据先到达辅基站，由辅基站转发给主基站，实现数据在辅基站中分离），则称为 SCG 分离 DRB。如未特别说明，本公开中所述分离 DRB 可以是 MCG 分离 DRB，也可以是 SCG 分离 DRB。本公开所述实施例也适用于不区分 MCG 分离 DRB 和 SCG 分离 DRB 的场景。

SRB：Signalling Radio Bearer，信令无线承载。所述承载可以用于传输 RRC 消息和 NAS 消息或仅用于传输 RRC 消息和 NAS 消息。SRB 可以包括 SRB0、SRB1、SRB1bis 和 SRB2。其中，SRB0 用于采用 CCCH 逻辑信道的 RRC 消息；SRB1 用于采用 DCCH 逻辑信道的 RRC 消息，所述 RRC 消息中可能包含 NAS 消息，SRB1 还用于在 SRB2 建立之前传输 NAS 消息。SRB1bis 用于安全激活前采用 DCCH 逻辑信道的 RRC 消息和 NAS 消息，所述 RRC 消息中可能包含 NAS 消息。SRB2 用于采用 DCCH 逻辑信道的 RRC 消息和 NAS 消息，所述 RRC 消息包括记录的测量信息（或称测量日志）。SRB 可以是 MCG SRB，也可以是 SCG SRB。本公开所述承载可以是

SRB 或 DRB。

分离 SRB：在双连接中，在 LTE/LTE-A/eLTE 中，无线协议位于主基站和辅基站且同时利用主基站和辅基站提供的资源的 SRB。如果分离 SRB 的 PDCP 实体和/或 RRC 位于主基站（即信令，也可称为数据，由主基站转发给辅基站，实现信令在主基站中分离），则称为 MCG 分离 SRB；如果分离 SRB 的 PDCP 实体和/或 RRC 位于辅基站（即信令，也可称为数据，由辅基站转发给主基站，实现信令在辅基站中分离），则称为 SCG 分离 SRB。

在双连接中，在 NR 中，如果一个承载的无线协议在主基站中分离且属于 MCG 和 SCG，则称为 MCG 分离承载。所述 MCG 分离承载可以是 MCG 分离 DRB 或 MCG 分离 SRB。

在双连接中，在 NR 中，如果一个承载的无线协议在辅基站中分离且属于 MCG 和 SCG，则称为 SCG 分离承载。所述 SCG 分离承载可以是 SCG 分离 DRB 或 SCG 分离 SRB。

本公开中所述分离 SRB 可以是 MCG 分离 SRB，也可以是 SCG 分离 SRB。本公开所述实施例也适用于不区分 MCG 分离 SRB 和 SCG 分离 SRB 的场景。分离 SRB 可以配置为采用分组重复或链路选择方式进行传输。

本公开中，分离承载可以包括：MCG 分离 DRB、MCG 分离 SRB、SCG 分离 DRB、SCG 分离 SRB。

分组重复：也可称为重复或数据重复，SRB 和 DRB 均可配置分组重复。当无线承载（包括 SRB 和 DRB）配置了分组重复时，为所述无线承载增加辅 RLC 实体和辅逻辑信道来处理重复的 PDCP PDU。PDCP 分组重复是指相同的 PDCP PDU 发送两次或多次，一次在原 RLC 实体，另一次在辅 RLC 实体，所述两次发送的 PDCP PDU 不在同一载波上发送。在双连接方式下，所述配置了分组重复的无线承载的两个逻辑信道属于不同的 MAC 实体。

分组重复分离承载：在双连接方式下，配置了分组重复的分离承载。在所述发送方式中，同一数据在分离承载的两个无线协议上发送，可以包括分组重复 MCG 分离 SRB、分组重复 SCG 分离 SRB、分组重复 MCG 分离 DRB 和分组重复 SCG 分离 DRB。如果是分组重复 MCG 分离承载，则由位于主基站或 MCG 的 PDCP 实体负责分组重复和/或重复分组移除；如果是分组重复 SCG 分离承载，则由位于辅基站或 SCG 的 PDCP 实体负责分组重复和/或重复分组移除。

图 1 示出了在双连接中，基站与用户设备 UE 之间进行分组重复 MCG 分离 SRB 下行传输的示意图。应理解，对于基站与 UE 之间进行分组重复 MCG 分离 SRB 上行传输可以采用同样的协议架构，只是数据从 UE 发送到基站，即，将图 1 中的箭头反向即可。如图 1 所示，数据（例如 PDCP PDU）在分离 SRB 的两个无线协议（对应于与同一 PDCP 实体相关联的两个 RLC 实体）上发送，利用主基站和辅基站资源。在双连接方式下，对应配置分组重复的分离 SRB，每个 PDCP PDU 经过两个 RLC 实体发送给接收方。主基站和辅基站间的接口可以记为 Xn 或 Xx 或 X2。根据 MeNB 和 SeNB 的不同类型，所述接口可以采用不同命名。例如，如果 MeNB 为 LTE eNB，SeNB 为 gNB，则所述接口记为 Xx；如果 MeNB 为 gNB，SeNB 为 eLTE eNB，则所述接口记为 Xn。

图 2 给出了双连接场景下用户设备 UE 中协议架构示意图。在图 2 所示示意图中，一个分离 SRB 的 RRC 实体和/或 PDCP 实体关联到两个 RLC 实体、两个逻辑信道和两个 MAC 实体。

本公开部分实施例以分组或 PDCP PDU 发送两次为例(即一个 PDCP PDCP PDU 在其关联的两个 RLC 实体和/或两个逻辑信道上发送)，但本公开所述的技术方案并不限于 PDCP PDU 发送两次的场景，本领域技术人员可以容易地扩展到 PDCP PDU 发送多次的场景(即一个 PDCP 实体关联多个 RLC 实体和/或多个逻辑信道)。

在本公开实施例中，将配置了分组重复的 MCG 分离 SRB 称为 MCG 重复 SRB；将仅使用主基站或 MCG 的资源的 SRB 或无线协议仅位于主基站或 MCG 的 SRB 称为 MCG SRB。

在本公开实施例中，可以将 SRB0 配置为 MCG SRB0，即 SRB0 的无线协议位于 MCG，采用 MCG 提供的无线资源进行传输（包括上行传输和下行传输）；可以将 SRB1 配置为 MCG SRB1 或 MCG 重复 SRB1；可以将 SRB2 配置为 MCG SRB2 或 MCG 重复 SRB2。MCG 重复 SRB1 或 SRB2 下行传输采用分组重复方式发送，上行传输通过 RRC 信令配置为采用 MCG 或 SCG 或 MCG 和 SCG。

在本公开实施例中，将属于或位于或对应 MCG 的 RLC 实体和 MAC 实体记为 MCG-RLC 和 MCG-MAC；将属于或位于或对应 SCG 的 RLC 实体和 MAC 实体记为 SCG-RLC 和 SCG-MAC。

图 3 示出了根据本公开实施例的用户设备中的方法 300 的流程图。UE 被配置有主小区组 MCG 重复信令无线承载 SRB（例如 SRB1），所述 MCG 重复 SRB 与主小区组 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输。

这里，用户设备 UE 可以接收到来自主基站的无线链路控制 RRC 信令（也可称为 RRC 消息），所述 RRC 信令用于为 UE 配置或重配置 MCG 重复 SRB1 或将 MCG SRB1 重配置为 MCG 重复 SRB1，所述 RRC 信令可以是 RRC 连接重配置消息 RRCConnectionReconfiguration。

在一个示例中，在用于配置 MCG 重复 SRB1 的 RRC 信令中携带一个指示标志，用于指示 MCG 重复 SRB1 的上行传输路径或上行传输方式或上行传输配置，MCG 重复 SRB1 的上行传输可以采用 MCG（即 MCG 提供的无线资源或 PDCP 实体将 PDCP PDU 发送到 MCG-RLC）、SCG（即 SCG 提供的无线资源或 PDCP 实体将 PDCP PDU 发送到 SCG-RLC）、MCG 和 SCG（即 MCG 和 SCG 提供的无线资源且采用分组重复方式传输或 PDCP 实体将同一 PDCP PDU 发送到 MCG-RLC 和 SCG-RLC）。所述指示标识的取值可以为 MCG，SCG，both 或 duplicate，当所述指示标志的取值为 MCG 时，表示 MCG 重复 SRB1 的上行传输采用 MCG，即 PDCP 实体将 SRB1 的数据或 PDCP PDU 发送到 MCG-RLC 和/或 MCG-MAC 并利用 MCG 的无线资源发送；当所述指示标志的取值为 SCG 时，表示 MCG 重复 SRB1 的上行传输采用 SCG，即 PDCP 实体将 SRB1 的数据或 PDCP PDU 通过 SCG-RLC 和/或 SCG-MAC 并利用 SCG 的无线资源发送；当所述指示标识的取值为 both 或 duplicate 时，表示 MCG 重复 SRB1 的上行传输采用 MCG 和 SCG，即 PDCP 实体将 SRB1 的同一数据或 PDCP PDU 通过 MCG-RLC、MCG-MAC 和 SCG-RLC、SCG-MAC 并利用 MCG 和 SCG 的无线资源发送（采用分组重复方式传输）。本实施例中，所述指示标识的取值也可以是其他值，不同取值分别用于指示 MCG 重复 SRB1 的上行传输采用 MCG、SCG 以及 MCG 和 SCG 三种方式中的一种。

在另一个实施例中，在用于配置 MCG 重复 SRB1 的 RRC 信令中携带一个指示标志，当所述指示标识的值为 0 或 Ture 或 setup 等时，表示 MCG 重复 SRB1 的上行传输采用 MCG(或 SCG)；当所述指示标识的值为 1 或 false

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或 Release 等时，表示 MCG 重复 SRB1 的上行传输采用 SCG(或 MCG)。当所述指示标识不出现时，表示 MCG 重复 SRB1 的上行传输采用 MCG 和 SCG。

在又一个实施例中，在用于配置 MCG 重复 SRB1 的 RRC 信令中携带一个指示标志，当所述指示标识的值为 0 或 Ture 或 setup 等时，表示 MCG 重复 SRB1 的上行传输采用 MCG 和 SCG(或 SCG)；当所述指示标识的值为 1 或 false 或 Release 等时，表示 MCG 重复 SRB1 的上行传输采用 SCG(或 MCG 和 SCG)。当所述指示标识不出现时，表示 MCG 重复 SRB1 的上行传输采用 MCG。

如图所示，方法 300 包括以下步骤。

在步骤 S310，检测到 SCG 失效。

需要说明的是，本公开所述 SCG 失效可以是 SCG 无线链路失效或改变 SCG 失败或在用于指示双连接场景中使用的功率控制模式的信息元素 powerControlMode 配置为 1 时，超过最大上行传输时间差（maximum uplink transmission timing difference）导致停止 PSCell 的上行传输。

本公开所述 SCG 无线链路失效可以由以下事件触发：

事件 1：用于监测 PSCell 不同步的定时器 T313 期满。

事件 2：接收到 SCG MAC 随机接入问题（或出错）指示。

事件 3：对于 SCG DRB 或分离 DRB 或 MCG 重复 SRB 或 SCG SRB，从 SCG RLC 实体接收到达到最大重传次数的指示。

表 1 中示出了定时器 T307 和 T313 启动/停止的条件以及所述定时器期满时执行的操作。

表 1

定时器	启动	停止	期满
T307	接收到包含指示改变 SCG 的信元 *MobilityControlInfoSCG* 的 RRC 重配置消息 *RRCConnectionReconfiguration*	在 PSCell 上执行随机接入成功或启动 re-establishment 或释放 SCG	发起 SCG 失效信息过程来通知 E-UTRAN 或 5G-RAN SCG 改变失败

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定时器	启动	停止	期满
T313	在 PSCell 上检测到物理层问题即，接收到来自下层的连续不同步 out-of-sync 指示达到 N313 次	对于 PSCell，接收到来自下层的连续同步 in-sync 指示达到 N314 次或发起连接重建过程或释放 SCG 或接收到包含 *MobilityControlInfoSCG* 的 *RRCConnectionReconfiguration*	发起 SCG 失效信息过程来通知 E-UTRAN 或 5G-RAN SCG 无线链路失效

在步骤 S320，将所述 MCG 重复 SRB 重配置为通过 MCG 进行上行传输，或触发 MCG 失效。

在一个示例中，所述 UE 还被配置有另一 MCG 重复 SRB（例如 SRB2），方法 300 还包括，在检测到 SCG 失效之后：将所述另一 MCG 重复 SRB 重配置为通过 MCG 进行上行传输。

在一个示例中，重配置可以通过释放所述 MCG 重复 SRB 或所述另一 MCG 重复 SRB 的上行传输配置来执行。

在一个示例中，方法 300 还包括：向基站报告 SCG 失效。向基站报告 SCG 失效包括：利用重配置的 MCG 重复 SRB，通过 MCG 向基站发送 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 向基站发送 SCG 失效信息。

在一个示例中，方法 300 还包括：从基站接收指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。所述重配置仅在所述指示信息指示在 SCG 失效时通过 MCG 进行上行传输的情况下执行。

具体地，对于上述用于配置 MCG 重复 SRB1 的实施例，RRC 信令还包含一个指示标识，所述指示标识用于指示当 SCG 失效时，是否可以采用 MCG 进行上行传输，或者如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG(或 MCG 和 SCG)，则 SCG 失效时是否可以采用 MCG 进行上行传输。例如，当所述指示标志的取值为“1”或“TRUE”或“setup”或所述指示标识出现，表示如果 MCG 重复 SRB 的上行传输被配置为采用 SCG 或 MCG 和 SCG，则当 SCG 失效时，MCG 重复 SRB 上行传输采用 MCG。当所述指示标志的取值为“0”或“false”或“release”或所述指示标识不出现，表示如果

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MCG 重复 SRB 的上行传输被配置为采用 SCG 或 MCG 和 SCG，则当 SCG 失效时，采用上行 UL 公共控制信道 CCCH 传输 SCG 失效信息或释放 MCG 重复 SRB 的上行传输配置。当所述指示标识指示 SCG 失效时 MCG 重复 SRB 上行传输采用 MCG，则当 MCG 重复 SRB 的上行传输被配置为采用 SCG 或 MCG 和 SCG，如果发生 SCG 失效，MCG 重复 SRB 上行传输采用 MCG。

需要说明的是，本公开所述将 MCG 重复 SRB(或分离 SRB)重配置为通过 MCG 进行上行传输也可以表述为重配置 MCG 重复 SRB(或分离 SRB)的 PDCP 实体使得 PDCP PDU 通过 MCG 或 MCG-RLC 传输或重配置 MCG 重复 SRB(或分离 SRB)的 PDCP 实体使得所述 PDCP 实体将 PDCP PDU 发送到 MCG-RLC。

以下参照具体示例来说明方法 300。这里，不失一般性，假设上述 MCG 重复 SRB 为 SRB1，上述另一 MCG 重复 SRB 为 SRB2。

用户设备 UE 检测到 SCG 失效，则启动 SCG 失效信息（SCG failure information）过程来上报 SCG 失效。用户设备根据 MCG 重复 SRB1 的不同上行传输配置，所述 SCG 失效信息过程有所不同。具体地，

1. 如果 MCG 重复 SRB1 的上行传输被配置为采用 MCG，则 SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 和分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 下行传输）；B. 重置（reset）SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程。所述 SCGFailureInformation 消息用于提供 UE 检测到的错误信息，采用 MCG 进行传输。
2. 如果 MCG 重复 SRB1 的上行传输被配置为采用 MCG 和 SCG，SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 和分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 的上行和/或下行传输）；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程。所述 SCGFailureInformation 消息采用 MCG 进行传输。
3. 如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG，则 SCG 失效信息过程在如下示例实现中描述。

示例实现 1

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 的 SCG 传输和/或分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 下行传输或 MCG 重复 SRB 的 SCG 传输）；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程，所述过程包括将 MCG 重复 SRB1 重配置为通过 MCG 进行上行传输，将 SCGFailureInformation 消息发送到下层进行传输；或者，指示或重配置 MCG 重复 SRB1 的 PDCP 实体将 SCGFailureInformation 消息通过 MCG 传输（即利用 MCG 提供的资源进行传输）；或者，重配置 MCG 重复 SRB1 的 PDCP 实体以释放将分离 SRB1 的数据(或上行数据)通过 SCG 传输的限制；或者，释放 MCG 重复 SRB1 上行传输配置。

示例实现 2

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 的 SCG 传输和/或 MCG 重复 SRB1 的 SCG 传输（或 MCG 重复 SRB1 的 SCG 下行传输）；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程，所述过程包括将 MCG 重复 SRB1 重配置为通过 MCG 进行上行传输，将 SCGFailureInformation 消息发送到下层进行传输；或者，指示或重配置 MCG 重复 SRB1 的 PDCP 实体将 SCGFailureInformation 消息通过 MCG 传输；或者，重配置 MCG 重复 SRB1 的 PDCP 实体以释放将分离 SRB1 的数据(或上行数据)通过 SCG 传输的限制；或者，释放 MCG 重复 SRB1 上行传输配置；E. 如果 MCG 重复 SRB2 的上行传输被配置为采用 SCG，则将 MCG 重复 SRB2 重配置为通过 MCG 进行上行传输，或者指示或重配置 PDCP 实体释放 MCG 重复 SRB2 的上行传输通过 SCG 传输的限制，或者挂起 MCG 重复 SRB2 的 SCG 传输，或者释放 MCG 重复 SRB2 上行传输配置。

示例实现 3

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 的 SCG 传输和/或分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 下行传输）；B. 将所有 MCG 重复 SRB 重配置为通过 MCG 进行上行传输或者，重配置所有 MCG 重复 SRB 的 PDCP 实体以释放将分离 SRB 的数据(或上行数据)通过 SCG 传输的限制；或者，释放 MCG 重复 SRB 上行传输配置；C. 重置（reset）SCG-MAC；D. 停止用于监测改变 SCG 失败的定时器 T307；E. 启动 SCGFailureInformation 消息的传输过程，所述 SCGFailureInformation 消息采用 MCG 传输。

示例实现 4

用户设备 UE 检测到 SCG 失效，如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG，则认为检测到了 MCG 的无线链路失效，启动 MCG 发生无线链路失效时应执行的相关过程。

可选地，对于上述用于配置 MCG 重复 SRB1 的实施例，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时是否触发 MCG 无线链路失效。当所述指示标识指示当 SCG 失效时触发 MCG 无线链路失效时，则如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG，认为检测到了 MCG 的无线链路失效，启动发生无线链路失效时应执行的相关过程。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时触发 MCG 无线链路失效。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不触发 MCG 无线链路失效。反之亦然。

可选地，对于上述用于配置 MCG 重复 SRB1 的实施例，如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG 或 MCG 和 SCG，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时是否触发 MCG 无线链路失效。当所述指示标识指示当 SCG 失效时触发 MCG 无线链路失效时，则如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG 或 MCG 和 SCG，认为检测到了 MCG 的无线链路失效，启动发生无线链路失效时应执行的相关过程。

示例实现 5

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG

DRB 和挂起分离 DRB 的 SCG 传输和/或分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 下行传输）；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程，采用 UL-CCCH 传输 SCGFailureInformation 消息或采用 UL-CCCH（即 SRB0）进行上行传输。

可选的，对于上述用于配置 MCG 重复 SRB1 的实施例，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时，是否采用 UL-CCCH 传输 SCGFailureInformation 消息或进行上行传输。如果所述指示标识的取值对应当 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息，才可以在 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不采用 UL-CCCH 传输 SCGFailureInformation 消息或触发 MCG 无线链路失效。反之亦然。

可选的，对于上述用于配置 MCG 重复 SRB1 的实施例，如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG 或 MCG 和 SCG，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时，是否采用 UL-CCCH 传输 SCGFailureInformation 消息。如果所述指示标识的取值对应当 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息，才可以在 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不采用 UL-CCCH 传输 SCGFailureInformation 消息或触发 MCG 无线链路失效。反之亦然。

示例实现 6

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 的 SCG 传输和/或分离 SRB 的 SCG 传输(或分离 SRB 的 SCG 下行传输)；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的

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定时器 T307；D. 启动传输 SCGFailureReport 消息的传输过程，所述消息用于指示 SCG 失效或用于请求基站重配置 MCG 重复 SRB 或用于提供 UE 检测到的错误信息，采用 UL-CCCH 传输 SCGFailureReport 消息或采用 UL-CCCH（即 SRB0）进行上行传输。可选的，如果 SCGFailureInformation 消息或所述消息包含的内容没有在 SCGFailureReport 消息中传输，UE 接收到来自基站的用于重配置 MCG 重复 SRB 的上行传输的消息后，启动传输 SCGFailureInformation 消息的传输过程，利用重配置的 MCG 重复 SRB 的上行传输传输 SCGFailureInformation 消息。

可选的，对于上述用于配置 MCG 重复 SRB1 的实施例，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时，是否采用 UL-CCCH 传输 SCGFailureReport 消息或进行上行传输。如果所述指示标识的取值对应当 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息，才可以在 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息；否则，不采用 UL-CCCH 传输 SCGFailureReport 消息或触发 MCG 无线链路失效。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不采用 UL-CCCH 传输 SCGFailureReport 消息或触发 MCG 无线链路失效。反之亦然。

可选的，对于上述用于配置 MCG 重复 SRB1 的实施例，如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG 或 MCG 和 SCG，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时，是否采用 UL-CCCH 传输 SCGFailureReport 消息。如果所述指示标识的取值对应当 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息，才可以在 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息；否则，不采用 UL-CCCH 传输 SCGFailureReport 消息或触发 MCG 无线链路失效。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不采用 UL-CCCH 传输 SCGFailureReport 消息或触发 MCG 无线链路失效。反之亦然。

需要说明的是，本公开中所示用于配置 MCG 重复 SRB1 的实施例也适用于配置 MCG 重复 SRB2，只要将各示例中的 SRB1 替换为 SRB2 即可。

需要说明的是，如果 MCG 重复 SRB2 被配置为上行采用 SCG，则当 SCG 失效时，上述 SCG 失效信息过程实施例中操作还可以包括：将 MCG 重复 SRB2 重配置为通过 MCG 进行上行传输。

与上述方法 300 相对应，本公开提供了一种用户设备 UE。图 4 示出了根据本公开实施例的 UE 400 的框图。UE 400 被配置有主小区组 MCG 重复信令无线承载 SRB，所述 MCG 重复 SRB 与主小区组 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输。如图所示，UE 400 包括：收发机 410、处理器 420 和存储器 430，所述处理器 430 存储所述处理器 420 可执行的指令，使得所述基站 400 执行以上结合图 3 描述的方法 300。

具体地，所述处理器 430 存储所述处理器 420 可执行的指令，使得 UE 400：检测到 SCG 失效；以及将所述 MCG 重复 SRB 重配置为通过 MCG 进行上行传输，或触发 MCG 失效。

在一个示例中，所述 UE 400 还被配置有另一 MCG 重复 SRB。所述处理器 430 还存储所述处理器 420 可执行的指令，使得 UE 400 在检测到 SCG 失效之后：将所述另一 MCG 重复 SRB 重配置为通过 MCG 进行上行传输。

在一个示例中，所述处理器 430 还存储所述处理器 420 可执行的指令，使得 UE 400：向基站报告 SCG 失效，其中，向基站报告 SCG 失效包括：利用重配置的 MCG 重复 SRB，通过 MCG 向基站发送 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 向基站发送 SCG 失效信息。

在一个示例中，所述处理器 430 还存储所述处理器 420 可执行的指令，使得 UE 400：从基站接收指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输，其中，所述重配置仅在所述指示信息指示在 SCG 失效时通过 MCG 进行上行传输的情况下执行。

本公开还提供了一种基站中的方法。图 5 是示出了根据本公开实施例的基站中的方法 500 的流程图。所述基站是主小区组 MCG 基站，通过 MCG 重复信令无线承载 SRB 与用户设备 UE 通信，所述 MCG 重复 SRB 与 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输。如图所示，方

法 500 包括以下步骤。

在步骤 S510，从所述 UE 接收辅小区组 SCG 失效的报告。

在步骤 S520，将所述 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在一个示例中，所述接收 SCG 失效的报告包括：利用重配置的 MCG 重复 SRB，通过 MCG 接收 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 接收 SCG 失效信息。

在一个示例中，所述基站还通过另一 MCG 重复 SRB 与所述 UE 通信，所述方法 500 还包括：将所述另一 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在一个示例中，所述方法 500 还包括：向所述 UE 发送指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。

以上结合方法 300 所描述的各个示例，尤其是示例实现 1～6，也适用于方法 500。

与上述方法 500 相对应，本公开提供了一种基站。图 6 示出了根据本公开实施例的基站 600 的框图。所述基站是主小区组 MCG 基站，通过 MCG 重复信令无线承载 SRB 与用户设备 UE 通信，所述 MCG 重复 SRB 与 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输。如图所示，基站 600 包括：收发机 610、处理器 620 和存储器 630，所述处理器 630 存储所述处理器 620 可执行的指令，使得所述基站 600 执行以上结合图 5 描述的方法 500。

具体地，所述处理器 630 存储所述处理器 620 可执行的指令，使得基站 600 从所述 UE 接收辅小区组 SCG 失效的报告；以及将所述 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在一个示例中，所述接收 SCG 失效的报告包括：利用重配置的 MCG 重复 SRB，通过 MCG 接收 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 接收 SCG 失效信息。

在一个示例中，所述基站还通过另一 MCG 重复 SRB 与所述 UE 通信，所述处理器 630 还存储所述处理器 620 可执行的指令，使得基站 600：将所述另一 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在一个示例中，所述处理器 630 存储所述处理器 620 可执行的指令，使得基站 600：向所述 UE 发送指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。

运行在根据本发明的设备上的计算机可执行指令或者程序可以是通过控制中央处理单元（CPU）来使计算机实现本发明的实施例功能的程序。该程序或由该程序处理的信息可以临时存储在易失性存储器（如随机存取存储器 RAM）、硬盘驱动器（HDD）、非易失性存储器（如闪速存储器）、或其他存储器系统中。

用于实现本发明各实施例功能的计算机可执行指令或程序可以记录在计算机可读存储介质上。可以通过使计算机系统读取记录在所述记录介质上的程序并执行这些程序来实现相应的功能。此处的所谓“计算机系统”可以是嵌入在该设备中的计算机系统，可以包括操作系统或硬件（如外围设备）。“计算机可读存储介质”可以是半导体记录介质、光学记录介质、磁性记录介质、短时动态存储程序的记录介质、或计算机可读的任何其他记录介质。

用在上述实施例中的设备的各种特征或功能模块可以通过电路（例如，单片或多片集成电路）来实现或执行。设计用于执行本说明书所描述的功能的电路可以包括通用处理器、数字信号处理器（DSP）、专用集成电路（ASIC）、现场可编程门阵列（FPGA）、或其他可编程逻辑器件、分立的门或晶体管逻辑、分立的硬件组件、或上述器件的任意组合。通用处理器可以是微处理器，也可以是任何现有的处理器、控制器、微控制器、或状态机。上述电路可以是数字电路，也可以是模拟电路。因半导体技术的进步而出现了替代现有集成电路的新的集成电路技术的情况下，本发明的一个或多个实施例也可以使用这些新的集成电路技术来实现。

此外，本发明并不局限于上述实施例。尽管已经描述了所述实施例的各种示例，但本发明并不局限于此。安装在室内或室外的固定或非移动电子设备可以用作终端设备或通信设备，如 AV 设备、厨房设备、清洁设备、空调、办公设备、自动贩售机、以及其他家用电器等。

如上，已经参考附图对本发明的实施例进行了详细描述。但是，具体的结构并不局限于上述实施例，本发明也包括不偏离本发明主旨的任何设

计改动。另外，可以在权利要求的范围内对本发明进行多种改动，通过适当地组合不同实施例所公开的技术手段所得到的实施例也包含在本发明的技术范围内。此外，上述实施例中所描述的具有相同效果的组件可以相互替代。

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说 明 书 附 图

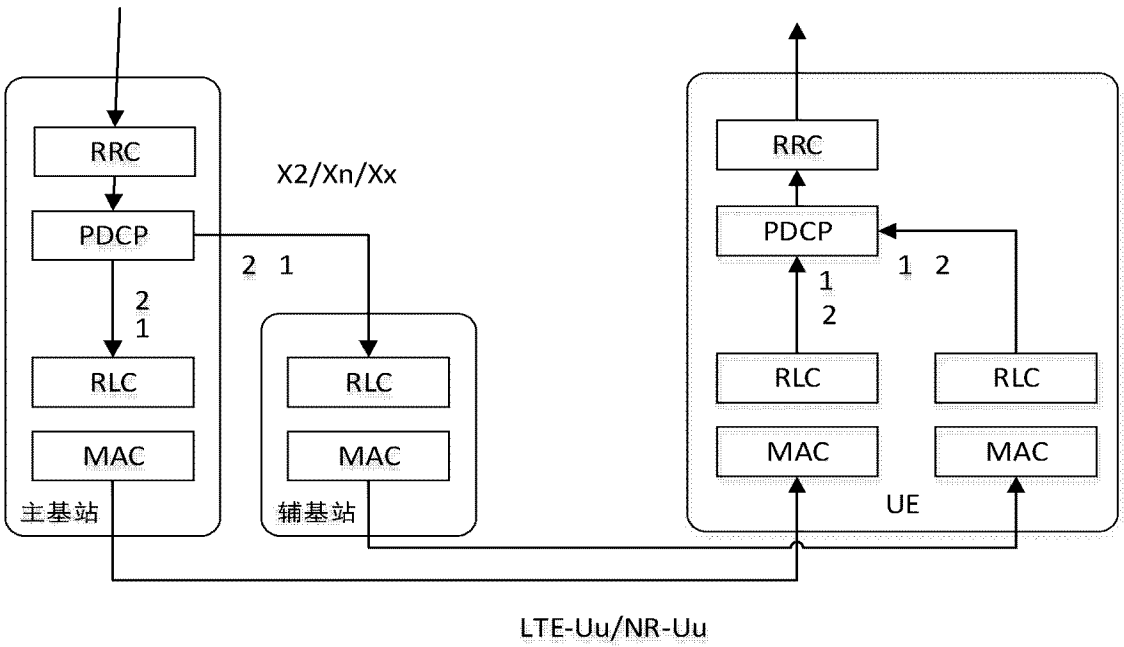


图1

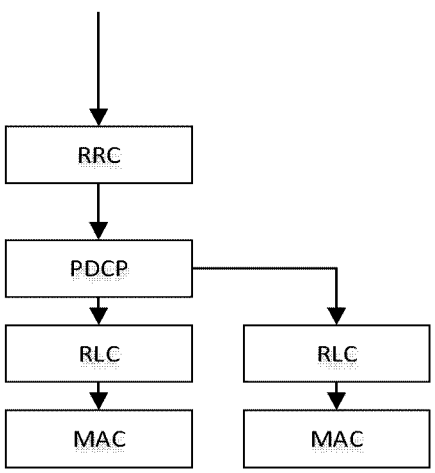


图2

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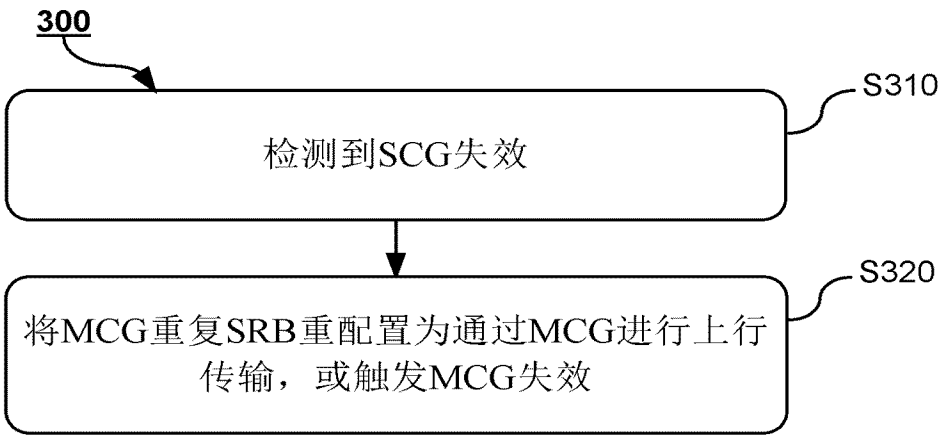


图3

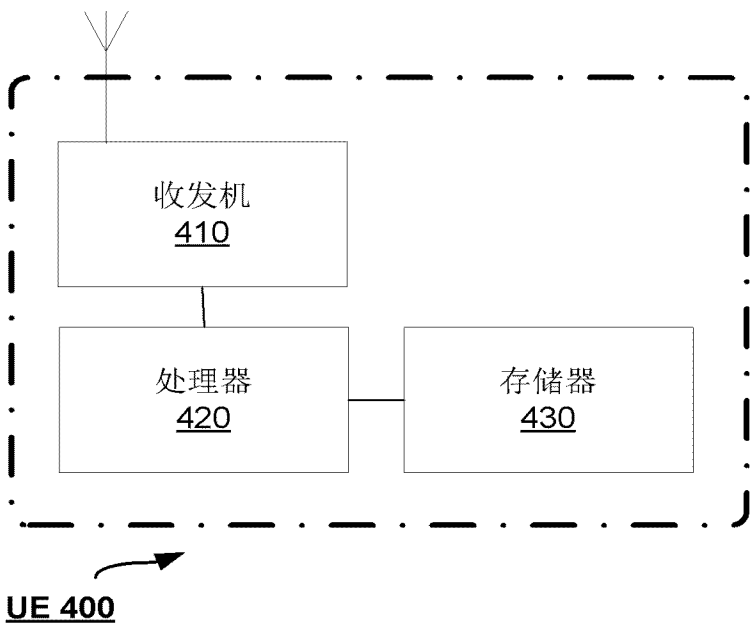


图4

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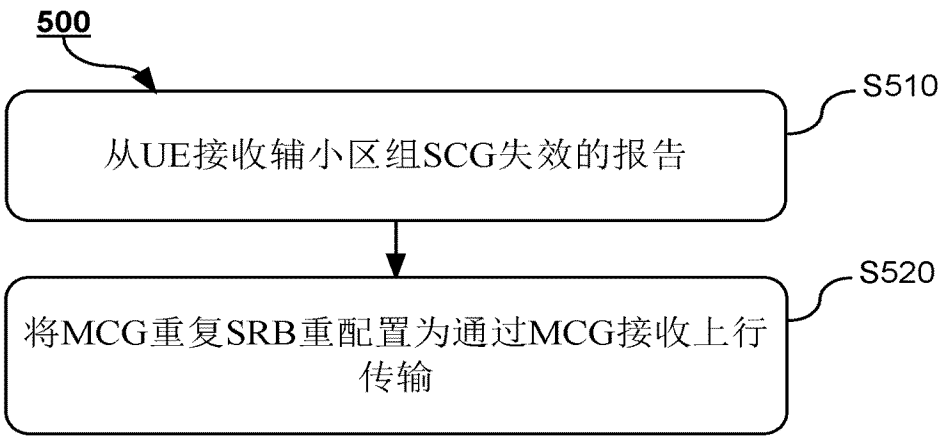


图5

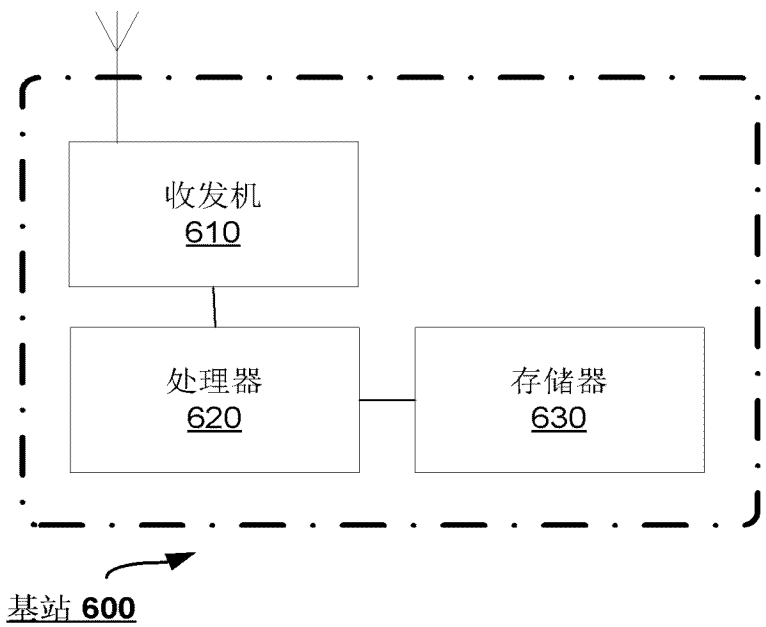


图6

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International application number:		**PCT/CN2018/099379**
International filing date:		**08 August 2018 (08.08.2018)**
Document type:		**Certified copy of priority document**
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PCT请求书

打印件(原件为电子形式)

0	由受理局填写	
0-1	国际申请号	PCT/CN2018/099379
0-2	国际申请日	2018年 8月 08日 (08.08.2018)
0-3	受理局名称和“PCT国际申请”	RO/CN

0-4	PCT/RO/101表 PCT请求书	
0-4-1	软件版本	CEPCT 版本 1.01.00/10.19.27 MT/FOP 20140331/0.20.5.21
0-5	请求 下列签字人请求按照专利合作条约的规定处理本国际申请	
0-6	申请人指定的受理局	中华人民共和国国家知识产权局 (RO/CN)
0-7	申请人或代理人的档案号	IP180226
I	发明名称	用户设备、基站和相关方法
II	申请人	
II-1	该人是	申请人 (applicant only)
II-2	是对下列国家的申请人	所有指定国 (all designated States)
II-4zh	名称	夏普株式会社
II-4en	Name:	SHARP KABUSHIKI KAISHA
II-5zh	地址	日本大阪府 堺市堺区匠町1番地 590-8522
II-5en	Address	, 1 Takumi-cho, Sakai-ku, Sakai City, , Osaka 590-8522 Japan
II-6	国籍	日本 JP
II-7	居所	日本 JP
II-8	电话号码	
II-9	传真号码	
II-11	申请人在专利局的登记号	

PCT请求书

打印件(原件为电子形式)

III-1	**申请人和/或发明人**	
III-1-1	该人是	申请人 (applicant only)
III-1-2	是对下列国家的申请人	SC
III-1-4 zh	姓名:	肖 芳英
III-1-4 en	Name (LAST, First):	XIAO, Fangying
III-1-5 zh	地址	中国上海市 浦东新区金海路1111号 201206
III-1-5 en	Address	No. 1111, Jinhai Rd., Pudong Shanghai 201206 China
III-1-6	国籍	中国 CN
III-1-7	居所	中国 CN
III-1-11	申请人在专利局的登记号	
III-2	**申请人和/或发明人**	
III-2-1	该人是	发明人 (inventor only)
III-2-3	对下列国家的发明人	
III-2-4 zh	姓名:	肖 芳英
III-2-4 en	Name (LAST, First):	XIAO, Fangying
III-2-5 zh	地址	中国上海市 浦东新区金海路1111号 201206
III-2-5 en	Address	No. 1111, Jinhai Rd., Pudong Shanghai 201206 China
III-3	**申请人和/或发明人**	
III-3-1	该人是	发明人 (inventor only)
III-3-3	对下列国家的发明人	
III-3-4 zh	姓名:	刘 仁茂
III-3-4 en	Name (LAST, First):	LIU, Renmao
III-3-5 zh	地址	中国上海市 浦东新区金海路1111号 201206
III-3-5 en	Address	No. 1111, Jinhai Rd., Pudong Shanghai 201206 China

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打印件(原件为电子形式)

IV-1	**代理人,共同代表或通信地址** 下列人员被委托/已经被委托为代表申请人在主管国际单位办理事务的	代理人 (agent)
IV-1-1zh	名称	中科专利商标代理有限责任公司
IV-1-1en	Name:	CHINA SCIENCE PATENT & TRADEMARK AGENT LTD.
IV-1-2zh	地址	中国北京市 海淀区西三环北路87号4-1105室 100089
IV-1-2en	Address:	Suite 4-1105, No. 87, West 3rd Ring North Rd., Haidian District Beijing 100089 China
IV-1-3	电话号码	010-68619696
IV-1-4	传真号码	010-82378400
IV-1-5	电子邮址	csptal@csptal.com
IV-1-5(a)	电子邮件授权 授权受理局、国际检索单位、国际局和国际初步审查单位，如果其愿意，使用本电子邮件地址发送有关本国际申请的通知书：	作为随后纸件通知书的预送本
IV-1-6	代理人登记号	11021
V	**国家的指定**	
V-1	**根据细则4.9(a)，提交本请求书即为，指定在国际申请日受PCT约束的所有成员国，以要求获得可以获得的所有保护类型，适用情况下，要求获得地区专利和国家专利。**	
V-2	**V-2栏只可用于（不可悔改地）排除对有关国家的指定，如果本国际申请在提交时或者在根据细则26之二.1的后续程序中，第VI栏包含有对在该有关国家提出的在先国家申请的优先权要求，以避免被要求优先权的该在先国家申请因国家法律而停止效力。**	
VI-1	**要求在先国家申请的优先权**	
VI-1-1	申请日	2017年 8月 10日 (10.08.2017)
VI-1-2	号码	201710683129.0
VI-1-3	国家	中国 CN
VI-2	**优先权文件请求** 请受理局准备并向国际局送交上述在先申请中标号如下的在先申请的证明副本:	VI-1
VI-3	**援引加入 :** 如果条约11（1）(iii)（d）或（e）规定的国际申请的某一项目，或者细则20.5(a)规定的说明书，权利要求书或附图的某一部分不包含在本国际申请中，但是全部包含在一个在先申请中，并且在受理局首次收到条约11（1）(iii)规定的一个或多个项目之日要求了该在先申请的优先权，则该项目或该部分可以依据细则20.6确认，为细则20.6的目的援引加入到该国际申请中。	
VII-1	**选定的国际检索单位**	中华人民共和国国家知识产权局 (ISA/CN)

PCT请求书

打印件(原件为电子形式)

VIII	声明	声明数目	
VIII-1	关于发明人身份的声明	–	
VIII-2	关于申请人在国际申请日有权申请和被授予专利的声明	–	
VIII-3	关于申请人在国际申请日有权要求在先申请的优先权的说明	–	
VIII-4	发明人资格声明(仅为指定美国目的)	–	
VIII-5	关于不影响新颖性的公开或缺乏新颖性的例外的声明	–	
IX	清单	页数	附以电子文档
IX-1	请求书(包括声明页)	4	✓
IX-2	说明书	19	✓
IX-3	权利要求	2	✓
IX-4	摘要	1	✓
IX-5	附图	3	✓
IX-7	共计	29	
	附件	附以纸件	附以电子文档
IX-8	费用计算页	–	✓
IX-11	总委托书副本	–	✓
IX-18	PCT-SAFE 物理载体	–	–
IX-20	应与摘要一起公布的附图图号	3	
IX-21	国际申请所用语言	中文	
X-1	申请人，代理人或共同代表的签字	/中科专利商标代理有限责任公司 /	
X-1-1	名称	中科专利商标代理有限责任公司	
X-1-2	签字人姓名	中科专利商标代理有限责任公司	
X-1-3	还要注明此人是以什么名义签字的	代理人	

由受理局填写

10-1	据称的国际申请文件的实际收到日期	2018年 8月 08日 (08.08.2018)
10-2	附图:	
10-2-1	收到	
10-2-2	未收到	
10-3	由于随后在期限内收到补充国际申请的文件或附图,更改的实际收到日期	
10-4	在期限内收到根据PCT第11(2)条所进行的改正的日期	
10-5	国际检索单位	ISA/CN
10-6	检索本的传送推迟到缴纳检索费后	

由国际局填写

11-1	国际局收到登记本的日期	

(12) 按照专利合作条约所公布的国际申请

(19) 世界知识产权组织
国 际 局

(43) 国际公布日
2019 年 2 月 14 日 (14.02.2019)

WIPO | PCT

(10) 国际公布号
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(21) 国际申请号: PCT/CN2018/099379

(22) 国际申请日: 2018 年 8 月 8 日 (08.08.2018)

(25) 申请语言: 中文

(26) 公布语言: 中文

(30) 优先权:
201710683129.0 2017年8月10日 (10.08.2017) CN

(71) 申请人: 夏 普 株 式 会 社 (SHARP KABUSHIKI KAISHA) [JP/JP]; 日本大阪府堺市堺区匠町1番地, Osaka 〒590-8522 (JP)。

(72) 发明人; 及

(71) 申请人 (仅对*SC*): 肖 芳 英 (XIAO, Fangying) [CN/CN]; 中 国 上 海 市 浦 东 新 区 金 海 路 1111 号, Shanghai 201206 (CN)。

(72) 发明人: 刘仁茂(LIU, Renmao); 中国上海市浦东新区金海路1111号, Shanghai 201206 (CN)。

(74) 代理人: 中 科 专 利 商 标 代 理 有 限 责 任 公 司 (CHINA SCIENCE PATENT & TRADEMARK AGENT LTD.); 中国北京市海淀区西三环北路87号4-1105室, Beijing 100089 (CN)。

(81) 指定国(除另有指明, 要求每一种可提供的国家保护): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW。

(54) **Title:** USER EQUIPMENT, BASE STATION, AND RELATED METHOD

(54) **发明名称**: 用户设备、基站和相关方法

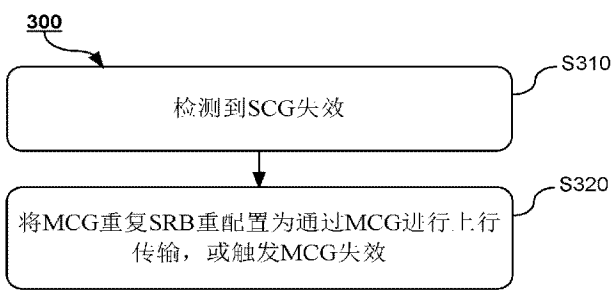


图3

S310 Detect that a SCG is invalid
S320 Reconfigure an MCG duplication SRB to perform uplink transmission by means of an MCG, or trigger the invalidity of the MCG

(57) **Abstract:** The present disclosure provides a method in a user equipment (UE). A master cell group (MCG) duplication signaling radio bearer (SRB) is configured to the UE, and the MCG duplication SRB is related to a master cell group (MCG) and a secondary cell group (SCG) and is configured to perform uplink transmission by means of the SCG. The method comprises: detecting that a SCG is invalid; and reconfiguring an MCG duplication SRB to perform uplink transmission by means of an MCG, or triggering the invalidity of the MCG.

(57) **摘要**: 本公开提供了一种用户设备UE中的方法，所述UE被配置有主小区组MCG重复信令无线承载SRB，所述MCG重复SRB与主小区组MCG和辅小区组SCG相关联并被配置为通过SCG进行上行传输，所述方法包括：检测到SCG失效；以及将所述MCG重复SRB重配置为通过MCG进行上行传输，或触发MCG失效。

[见续页]

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(84) 指定国(除另有指明，要求每一种可提供的地区保护)：ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), 欧亚 (AM, AZ, BY, KG, KZ, RU, TJ, TM), 欧洲 (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG)。

本国际公布：

— 包括国际检索报告(条约第21条(3))。

用户设备、基站和相关方法

技术领域

本公开涉及无线通信技术领域，更具体地，本公开涉及用户设备、基站和与辅小区组 SCG 失效相关的方法。

背景技术

2016 年 3 月，在第三代合作伙伴计划 (3rd Generation Partnership Project：3GPP) RAN#71 次全会上，NTT DOCOMO 提出了一个关于 5G 技术标准的新的研究项目（参见非专利文献：RP-160671：New SID Proposal：Study on New Radio Access Technology），并获批准。该研究项目的目的是开发一个新的无线（New Radio：NR）接入技术以满足 5G 的所有应用场景、需求和部署环境。NR 主要有三个应用场景：增强的移动宽带通信（Enhanced mobile broadband：eMBB）、大规模机器类通信（massive Machine type communication：mMTC）和超可靠低延迟通信（Ultra reliable and low latency communications：URLLC)。

在 2016 年 10 月召开的 3GPP RAN2 #96 次会议上达成为满足 URLLC 对可靠性的要求，对多连接（包括双连接）进行研究。所述多连接可以采用分组重复（也称为包重复）或连路选择等机制。在 2017 年 1 月召开的 3GPP NR AdHoc 会议上达成在 NR-PDCP 实体中支持用户面和数据面的分组重复功能，发送端 PDCP 实体功能支持分组重复，且接收端 PDCP 实体功能支持删除重复包。在 2017 年 6 月召开的 3GPP NR AdHoc 会议上达成在双连接场景下，主基站决定是否使用主小区组 MCG 重复信令无线承载 SRB 并通过主基站无线链路控制 RRC 信令配置 MCG 重复 SRB。此外，此次会议还达成在双连接场景中，对于 MCG 重复 SRB，通过 RRC 信令配置上行传输采用 MCG、辅小区组 SCG 还是在 MCG 和 SCG 采用重复传输方式传输。

期望解决在支持分组重复的双连接场景下的，当 RRC 信令为 MCG 重复 SRB 配置了上行传输采用 SCG，但发生 SCG 失效所涉及的问题。

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发明内容

根据本公开的第一方面，提供了一种用户设备 UE 中的方法，所述 UE 被配置有主小区组 MCG 重复信令无线承载 SRB，所述 MCG 重复 SRB 与主小区组 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输，所述方法包括：检测到 SCG 失效；以及将所述 MCG 重复 SRB 重配置为通过 MCG 进行上行传输，或触发 MCG 失效。

在实施例中，所述 UE 还被配置有另一 MCG 重复 SRB，所述方法还包括，在检测到 SCG 失效之后：将所述另一 MCG 重复 SRB 重配置为通过 MCG 进行上行传输。

在实施例中，所述方法还包括：向基站报告 SCG 失效，其中，向基站报告 SCG 失效包括：利用重配置的 MCG 重复 SRB，通过 MCG 向基站发送 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 向基站发送 SCG 失效信息。

在实施例中，所述方法还包括：从基站接收指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输，其中，所述重配置仅在所述指示信息指示在 SCG 失效时通过 MCG 进行上行传输的情况下执行。

根据本公开的第二方面，提供了一种用户设备 UE，包括收发机、处理器和存储器，所述处理器存储所述处理器可执行的指令，使得所述 UE 执行根据上述第一方面所述的方法。

根据本公开的第三方面，提供了一种基站中的方法，所述基站是主小区组 MCG 基站，通过 MCG 重复信令无线承载 SRB 与用户设备 UE 通信，所述 MCG 重复 SRB 与 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输，所述方法包括：从所述 UE 接收辅小区组 SCG 失效的报告；以及将所述 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在实施例中，所述接收 SCG 失效的报告包括：利用重配置的 MCG 重复 SRB，通过 MCG 接收 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 接收 SCG 失效信息。

在实施例中，所述基站还通过另一 MCG 重复 SRB 与所述 UE 通信，

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所述方法还包括：将所述另一 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在实施例中，所述方法还包括：向所述 UE 发送指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。

根据本公开的第四方面，提供了一种基站，包括收发机、处理器和存储器，所述处理器存储所述处理器可执行的指令，使得所述基站执行根据上述第三方面所述的方法。

附图说明

通过下文结合附图的详细描述，本公开的上述和其它特征将会变得更加明显，其中：

图 1 示出了 MCG 重复 SRB 数据传输的示意图；

图 2 示出了用户设备 UE 中协议架构的示意图；

图 3 示出了根据本公开实施例的用户设备中的方法的流程图；

图 4 示出了根据本公开实施例的用户设备的框图；

图 5 示出了根据本公开实施例的基站中的方法的流程图；

图 6 示出了根据本公开实施例的基站的框图。

具体实施方式

下面结合附图和具体实施方式对本公开进行详细阐述。应当注意，本公开不应局限于下文所述的具体实施方式。另外，为了简便起见，省略了对与本公开没有直接关联的公知技术的详细描述，以防止对本公开的理解造成混淆。

下面描述本公开涉及的部分术语，如未特别说明，本公开涉及的术语采用此处定义。本公开给出的术语在 NR、LTE 和 eLTE 中可能采用不同的命名方式，但本公开中采用统一的术语，在应用到具体的系统中时，可以替换为相应系统中采用的术语。

RRC：Radio Resource Control，无线资源控制。

PDCP：Packet Data Convergence Protocol，分组数据汇聚协议。在本公开中，如未特别说明，PDCP 可以表示 NR 或 LTE 或 eLTE 中的 PDCP。

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RLC：Radio Link Control，无线链路控制。在本公开中，如未特别说明，RLC 可以表示 NR 或 LTE 或 eLTE 中的 RLC。RLC 实体的传输模式可以配置为透传模式 TM、非确认模式 UM 或确认模式 AM 之一。

MAC：Medium Access Control，媒体访问控制。在本公开中，如未特别说明，MAC 可以表示 NR 或 LTE 或 eLTE 中的 MAC 实体。

CCCH：Common Control Channel，公共控制信道。

PDU：Protocol Data Unit，协议数据单元。

SDU：Service Data Unit，服务数据单元。

在本公开中，将从上层接收或发往上层的数据称为 SDU，将发往下层或从下层接收的数据称为 PDU。例如，PDCP 实体从上层接收的数据或发往上层的数据称为 PDCP SDU；PDCP 实体从 RLC 实体接收到的数据或发往 RLC 实体的数据称为 PDCP PDU（也就是 RLC SDU）。

主基站：Master eNB 或 Master gNB，记为 MeNB（对应 E-UTRAN 或 LTE 或 eLTE 的基站）或 MgNB（对应 5G-RAN 或 NR 的基站）。在双连接中，至少终止于处理 UE 与核心网间交互的控制节点移动管理实体（可记为 S1-MME）的 eNB；或者，至少终止于 NG-C 的 gNB，所述 NG-C 是 NG-RAN 和 5GC 的控制面接口。

辅基站：Secondary eNB 或 Secondary gNB，记为 SeNB（对应 E-UTRAN 或 LTE 或 eLTE 的基站）或 SgNB(对应 5G-RAN 或 NR 的基站)。在双连接中，不是主基站但为 UE 提供额外的无线资源的基站。

主小区：Primary Cell，PCell。工作在主频率上的小区，可以是 UE 在其上执行初始连接建立过程或发起连接重建过程或在切换过程中被指定为主小区的小区。本公开所述小区也可称为载波或光束集（a set of beam）。

主辅小区：Primary Secondary Cell，PSCell。在执行改变 SCG 的过程中指示 UE 用于执行随机接入的 SCG 小区。

辅小区：Secondary Cell，SCell。工作在辅频率上的小区，所述小区可在 RRC 连接建立之后配置且可用于提供额外的无线资源。

小区组：Cell Group ，CG，在双连接或多连接中，关联到主基站或辅基站的一组服务小区或载波。

主小区组：Master Cell Group，MCG。对于未配置双连接的 UE，

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MCG 由所有的服务小区组成；对于配置了双连接的 UE，MCG 由服务小区的子集组成（即关联到主基站的一组服务小区），其中包含 PCell 和 0 个或 1 个或多个 SCell。

辅小区组：Secondary Cell Group，SCG。在双连接中，与 SeNB 或 SgNB 关联的一组服务小区。SCG 可以包含一个 PSCell，还可以包含一个或多个 SCell。

双连接：在 NR 中，处于 RRC 连接态下 UE 的被配置为利用两个不同的调度器所提供的资源，所述两个调度器分别位于两个通过非理想回程（non-ideal backhaul）连接的基站。在 LTE/LTE-A/eLTE 中，处于 RRC 连接态的 UE 配置了一个 MCG 和一个 SCG；换言之，处于连接态的具有两个个接收机和/或发送机的 UE 被配置为使用由两个不同的调度器提供的 EUTRAN 无线资源，所述调度器可以通过非理想回程连接。双连接数据传输方式包括但不限于：数据重复，链路选择。所述链路选择传输方式是指同一数据或 PDCP PDU 或 PDCP SDU 在为 UE 配置的两个小区组或两个小区组提供的无线资源中的其中一个小区组发送。

DRB：Data Radio Bearer carrying user plane data，承载用户面数据的数据无线承载或简称数据承载。

分离 DRB：在双连接中，在 LTE/LTE-A/eLTE 中，无线协议位于主基站和辅基站且同时利用主基站和辅基站提供的资源的 DRB。如果分离 DRB 的 PDCP 实体位于主基站（即数据先到达主基站，由主基站转发给辅基站，实现数据在主基站中分离），则称为 MCG 分离 DRB；如果分离 DRB 的 PDCP 实体位于辅基站（即数据先到达辅基站，由辅基站转发给主基站，实现数据在辅基站中分离），则称为 SCG 分离 DRB。如未特别说明，本公开中所述分离 DRB 可以是 MCG 分离 DRB，也可以是 SCG 分离 DRB。本公开所述实施例也适用于不区分 MCG 分离 DRB 和 SCG 分离 DRB 的场景。

SRB：Signalling Radio Bearer，信令无线承载。所述承载可以用于传输 RRC 消息和 NAS 消息或仅用于传输 RRC 消息和 NAS 消息。SRB 可以包括 SRB0、SRB1、SRB1bis 和 SRB2。其中，SRB0 用于采用 CCCH 逻辑信道的 RRC 消息；SRB1 用于采用 DCCH 逻辑信道的 RRC 消息，所述 RRC 消息中可能包含 NAS 消息，SRB1 还用于在 SRB2 建立之前传

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输 NAS 消息。SRB1bis 用于安全激活前采用 DCCH 逻辑信道的 RRC 消息和 NAS 消息，所述 RRC 消息中可能包含 NAS 消息。SRB2 用于采用 DCCH 逻辑信道的 RRC 消息和 NAS 消息，所述 RRC 消息包括记录的测量信息（或称测量日志）。SRB 可以是 MCG SRB，也可以是 SCG SRB。本公开所述承载可以是 SRB 或 DRB。

分离 SRB：在双连接中，在 LTE/LTE-A/eLTE 中，无线协议位于主基站和辅基站且同时利用主基站和辅基站提供的资源的 SRB。如果分离 SRB 的 PDCP 实体和/或 RRC 位于主基站（即信令，也可称为数据，由主基站转发给辅基站，实现信令在主基站中分离），则称为 MCG 分离 SRB；如果分离 SRB 的 PDCP 实体和/或 RRC 位于辅基站（即信令，也可称为数据，由辅基站转发给主基站，实现信令在辅基站中分离），则称为 SCG 分离 SRB。

在双连接中，在 NR 中，如果一个承载的无线协议在主基站中分离且属于 MCG 和 SCG，则称为 MCG 分离承载。所述 MCG 分离承载可以是 MCG 分离 DRB 或 MCG 分离 SRB。

在双连接中，在 NR 中，如果一个承载的无线协议在辅基站中分离且属于 MCG 和 SCG，则称为 SCG 分离承载。所述 SCG 分离承载可以是 SCG 分离 DRB 或 SCG 分离 SRB。

本公开中所述分离 SRB 可以是 MCG 分离 SRB，也可以是 SCG 分离 SRB。本公开所述实施例也适用于不区分 MCG 分离 SRB 和 SCG 分离 SRB 的场景。分离 SRB 可以配置为采用分组重复或链路选择方式进行传输。

本公开中，分离承载可以包括：MCG 分离 DRB、MCG 分离 SRB、SCG 分离 DRB、SCG 分离 SRB。

分组重复：也可称为重复或数据重复，SRB 和 DRB 均可配置分组重复。当无线承载（包括 SRB 和 DRB）配置了分组重复时，为所述无线承载增加辅 RLC 实体和辅逻辑信道来处理重复的 PDCP PDU。PDCP 分组重复是指相同的 PDCP PDU 发送两次或多次，一次在原 RLC 实体，另一次在辅 RLC 实体，所述两次发送的 PDCP PDU 不在同一载波上发送。在双连接方式下，所述配置了分组重复的无线承载的两个逻辑信道属于不同的 MAC 实体。

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分组重复分离承载：在双连接方式下，配置了分组重复的分离承载。在所述发送方式中，同一数据在分离承载的两个无线协议上发送，可以包括分组重复 MCG 分离 SRB、分组重复 SCG 分离 SRB、分组重复 MCG 分离 DRB 和分组重复 SCG 分离 DRB。如果是分组重复 MCG 分离承载，则由位于主基站或 MCG 的 PDCP 实体负责分组重复和/或重复分组移除；如果是分组重复 SCG 分离承载，则由位于辅基站或 SCG 的 PDCP 实体负责分组重复和/或重复分组移除。

图 1 示出了在双连接中，基站与用户设备 UE 之间进行分组重复 MCG 分离 SRB 下行传输的示意图。应理解，对于基站与 UE 之间进行分组重复 MCG 分离 SRB 上行传输可以采用同样的协议架构，只是数据从 UE 发送到基站，即，将图 1 中的箭头反向即可。如图 1 所示，数据（例如 PDCP PDU）在分离 SRB 的两个无线协议（对应于与同一 PDCP 实体相关联的两个 RLC 实体）上发送，利用主基站和辅基站资源。在双连接方式下，对应配置分组重复的分离 SRB，每个 PDCP PDU 经过两个 RLC 实体发送给接收方。主基站和辅基站间的接口可以记为 Xn 或 Xx 或 X2。根据 MeNB 和 SeNB 的不同类型，所述接口可以采用不同命名。例如，如果 MeNB 为 LTE eNB， SeNB 为 gNB，则所述接口记为 Xx；如果 MeNB 为 gNB， SeNB 为 eLTE eNB，则所述接口记为 Xn。

图 2 给出了双连接场景下用户设备 UE 中协议架构示意图。在图 2 所示示意图中，一个分离 SRB 的 RRC 实体和/或 PDCP 实体关联到两个 RLC 实体、两个逻辑信道和两个 MAC 实体。

本公开部分实施例以分组或 PDCP PDU 发送两次为例(即一个 PDCP PDCP PDU 在其关联的两个 RLC 实体和/或两个逻辑信道上发送)，但本公开所述的技术方案并不限于 PDCP PDU 发送两次的场景，本领域技术人员可以容易地扩展到 PDCP PDU 发送多次的场景(即一个 PDCP 实体关联多个 RLC 实体和/或多个逻辑信道)。

在本公开实施例中，将配置了分组重复的 MCG 分离 SRB 称为 MCG 重复 SRB；将仅使用主基站或 MCG 的资源的 SRB 或无线协议仅位于主基站或 MCG 的 SRB 称为 MCG SRB。

在本公开实施例中，可以将 SRB0 配置为 MCG SRB0，即 SRB0 的无线协议位于 MCG，采用 MCG 提供的无线资源进行传输（包括上行传

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输和下行传输）；可以将 SRB1 配置为 MCG SRB1 或 MCG 重复 SRB1；可以将 SRB2 配置为 MCG SRB2 或 MCG 重复 SRB2。MCG 重复 SRB1 或 SRB2 下行传输采用分组重复方式发送，上行传输通过 RRC 信令配置为采用 MCG 或 SCG 或 MCG 和 SCG。

在本公开实施例中，将属于或位于或对应 MCG 的 RLC 实体和 MAC 实体记为 MCG-RLC 和 MCG-MAC；将属于或位于或对应 SCG 的 RLC 实体和 MAC 实体记为 SCG-RLC 和 SCG-MAC。

图 3 示出了根据本公开实施例的用户设备中的方法 300 的流程图。UE 被配置有主小区组 MCG 重复信令无线承载 SRB（例如 SRB1），所述 MCG 重复 SRB 与主小区组 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输。

这里，用户设备 UE 可以接收到来自主基站的无线链路控制 RRC 信令（也可称为 RRC 消息），所述 RRC 信令用于为 UE 配置或重配置 MCG 重复 SRB1 或将 MCG SRB1 重配置为 MCG 重复 SRB1，所述 RRC 信令可以是 RRC 连接重配置消息 RRCConnectionReconfiguration。

在一个示例中，在用于配置 MCG 重复 SRB1 的 RRC 信令中携带一个指示标志，用于指示 MCG 重复 SRB1 的上行传输路径或上行传输方式或上行传输配置，MCG 重复 SRB1 的上行传输可以采用 MCG（即 MCG 提供的无线资源或 PDCP 实体将 PDCP PDU 发送到 MCG-RLC）、SCG（即 SCG 提供的无线资源或 PDCP 实体将 PDCP PDU 发送到 SCG-RLC）、MCG 和 SCG（即 MCG 和 SCG 提供的无线资源且采用分组重复方式传输或 PDCP 实体将同一 PDCP PDU 发送到 MCG-RLC 和 SCG-RLC）。所述指示标识的取值可以为 MCG，SCG，both 或 duplicate，当所述指示标志的取值为 MCG 时，表示 MCG 重复 SRB1 的上行传输采用 MCG，即 PDCP 实体将 SRB1 的数据或 PDCP PDU 发送到 MCG-RLC 和/或 MCG-MAC 并利用 MCG 的无线资源发送；当所述指示标志的取值为 SCG 时，表示 MCG 重复 SRB1 的上行传输采用 SCG，即 PDCP 实体将 SRB1 的数据或 PDCP PDU 通过 SCG-RLC 和/或 SCG-MAC 并利用 SCG 的无线资源发送；当所述指示标识的取值为 both 或 duplicate 时，表示 MCG 重复 SRB1 的上行传输采用 MCG 和 SCG，即 PDCP 实体将

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SRB1 的同一数据或 PDCP PDU 通过 MCG-RLC、MCG-MAC 和 SCG-RLC、SCG-MAC 并利用 MCG 和 SCG 的无线资源发送（采用分组重复方式传输）。本实施例中，所述指示标识的取值也可以是其他值，不同取值分别用于指示 MCG 重复 SRB1 的上行传输采用 MCG、SCG 以及 MCG 和 SCG 三种方式中的一种。

在另一个实施例中，在用于配置 MCG 重复 SRB1 的 RRC 信令中携带一个指示标志，当所述指示标识的值为 0 或 Ture 或 setup 等时，表示 MCG 重复 SRB1 的上行传输采用 MCG(或 SCG)；当所述指示标识的值为 1 或 false 或 Release 等时，表示 MCG 重复 SRB1 的上行传输采用 SCG(或 MCG)。当所述指示标识不出现时，表示 MCG 重复 SRB1 的上行传输采用 MCG 和 SCG。

在又一个实施例中，在用于配置 MCG 重复 SRB1 的 RRC 信令中携带一个指示标志，当所述指示标识的值为 0 或 Ture 或 setup 等时，表示 MCG 重复 SRB1 的上行传输采用 MCG 和 SCG(或 SCG)；当所述指示标识的值为 1 或 false 或 Release 等时，表示 MCG 重复 SRB1 的上行传输采用 SCG(或 MCG 和 SCG)。当所述指示标识不出现时，表示 MCG 重复 SRB1 的上行传输采用 MCG。

如图所示，方法 300 包括以下步骤。

在步骤 S310，检测到 SCG 失效。

需要说明的是，本公开所述 SCG 失效可以是 SCG 无线链路失效或改变 SCG 失败或在用于指示双连接场景中使用的功率控制模式的信息元素 powerControlMode 配置为 1 时，超过最大上行传输时间差（maximum uplink transmission timing difference）导致停止 PSCell 的上行传输。

本公开所述 SCG 无线链路失效可以由以下事件触发：

事件 1：用于监测 PSCell 不同步的定时器 T313 期满。

事件 2：接收到 SCG MAC 随机接入问题（或出错）指示。

事件 3：对于 SCG DRB 或分离 DRB 或 MCG 重复 SRB 或 SCG SRB，从 SCG RLC 实体接收到达到最大重传次数的指示。

表 1 中示出了定时器 T307 和 T313 启动/停止的条件以及所述定时器期满时执行的操作。

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表 1

定时器	启动	停止	期满
T307	接收到包含指示改变SCG的信元 *MobilityControlInfoSCG* 的 RRC 重配置消息 *RRCConnectionReconfiguration*	在 PSCell 上执行随机接入成功或启动 re-establishment 或释放 SCG	发起 SCG 失效信息过程来通知 E-UTRAN 或 5G-RAN SCG 改变失败
T313	在 PSCell 上检测到物理层问题即，接收到来自下层的连续不同步 out-of-sync 指示达到 N313 次	对于 PSCell，接收到来自下层的连续同步 in-sync 指示达到 N314 次或发起连接重建过程或释放 SCG 或接收到包含 *MobilityControlInfoSCG* 的 *RRCConnectionReconfiguration*	发起 SCG 失效信息过程来通知 E-UTRAN 或 5G-RAN SCG 无线链路失效

在步骤 S320，将所述 MCG 重复 SRB 重配置为通过 MCG 进行上行传输，或触发 MCG 失效。

在一个示例中，所述 UE 还被配置有另一 MCG 重复 SRB（例如 SRB2），方法 300 还包括，在检测到 SCG 失效之后：将所述另一 MCG 重复 SRB 重配置为通过 MCG 进行上行传输。

在一个示例中，重配置可以通过释放所述 MCG 重复 SRB 或所述另一 MCG 重复 SRB 的上行传输配置来执行。

在一个示例中，方法 300 还包括：向基站报告 SCG 失效。向基站报告 SCG 失效包括：利用重配置的 MCG 重复 SRB，通过 MCG 向基站发送 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 向基站发送 SCG 失效信息。

在一个示例中，方法 300 还包括：从基站接收指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。所述重配置仅在所述指示信息指示在 SCG 失效时通过 MCG 进行上行传输的情况下执行。

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具体地，对于上述用于配置 MCG 重复 SRB1 的实施例，RRC 信令还包含一个指示标识，所述指示标识用于指示当 SCG 失效时，是否可以采用 MCG 进行上行传输，或者如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG(或 MCG 和 SCG)，则 SCG 失效时是否可以采用 MCG 进行上行传输。例如，当所述指示标志的取值为“1”或“TRUE”或“setup”或所述指示标识出现，表示如果 MCG 重复 SRB 的上行传输被配置为采用 SCG 或 MCG 和 SCG，则当 SCG 失效时，MCG 重复 SRB 上行传输采用 MCG。当所述指示标志的取值为“0”或“false”或“release”或所述指示标识不出现，表示如果 MCG 重复 SRB 的上行传输被配置为采用 SCG 或 MCG 和 SCG，则当 SCG 失效时，采用上行 UL 公共控制信道 CCCH 传输 SCG 失效信息或释放 MCG 重复 SRB 的上行传输配置。当所述指示标识指示 SCG 失效时 MCG 重复 SRB 上行传输采用 MCG，则当 MCG 重复 SRB 的上行传输被配置为采用 SCG 或 MCG 和 SCG，如果发生 SCG 失效，MCG 重复 SRB 上行传输采用 MCG。

需要说明的是，本公开所述将 MCG 重复 SRB(或分离 SRB)重配置为通过 MCG 进行上行传输也可以表述为重配置 MCG 重复 SRB(或分离 SRB)的 PDCP 实体使得 PDCP PDU 通过 MCG 或 MCG-RLC 传输或重配置 MCG 重复 SRB(或分离 SRB)的 PDCP 实体使得所述 PDCP 实体将 PDCP PDU 发送到 MCG-RLC。

以下参照具体示例来说明方法 300。这里，不失一般性，假设上述 MCG 重复 SRB 为 SRB1，上述另一 MCG 重复 SRB 为 SRB2。

用户设备 UE 检测到 SCG 失效，则启动 SCG 失效信息（SCG failure information）过程来上报 SCG 失效。用户设备根据 MCG 重复 SRB1 的不同上行传输配置，所述 SCG 失效信息过程有所不同。具体地，

1. 如果 MCG 重复 SRB1 的上行传输被配置为采用 MCG，则 SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 和分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 下行传输）；B. 重置（reset）SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程。所述 SCGFailureInformation 消息用于提供 UE 检测到的错误信息，采

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用 MCG 进行传输。

2. 如果 MCG 重复 SRB1 的上行传输被配置为采用 MCG 和 SCG，SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 和分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 的上行和/或下行传输）；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程。所述 SCGFailureInformation 消息采用 MCG 进行传输。

3. 如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG，则 SCG 失效信息过程在如下示例实现中描述。

示例实现 1

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 的 SCG 传输和/或分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 下行传输或 MCG 重复 SRB 的 SCG 传输）；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程，所述过程包括将 MCG 重复 SRB1 重配置为通过 MCG 进行上行传输，将 SCGFailureInformation 消息发送到下层进行传输；或者，指示或重配置 MCG 重复 SRB1 的 PDCP 实体将 SCGFailureInformation 消息通过 MCG 传输（即利用 MCG 提供的资源进行传输）；或者，重配置 MCG 重复 SRB1 的 PDCP 实体以释放将分离 SRB1 的数据(或上行数据)通过 SCG 传输的限制；或者，释放 MCG 重复 SRB1 上行传输配置。

示例实现 2

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 的 SCG 传输和/或 MCG 重复 SRB1 的 SCG 传输（或 MCG 重复 SRB1 的 SCG 下行传输）；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程，所述过程包括将 MCG 重复 SRB1 重配置为通过 MCG 进行上行传输，将 SCGFailureInformation 消息

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发送到下层进行传输；或者，指示或重配置 MCG 重复 SRB1 的 PDCP 实体将 SCGFailureInformation 消息通过 MCG 传输；或者，重配置 MCG 重复 SRB1 的 PDCP 实体以释放将分离 SRB1 的数据(或上行数据)通过 SCG 传输的限制；或者，释放 MCG 重复 SRB1 上行传输配置；E. 如果 MCG 重复 SRB2 的上行传输被配置为采用 SCG，则将 MCG 重复 SRB2 重配置为通过 MCG 进行上行传输，或者指示或重配置 PDCP 实体释放 MCG 重复 SRB2 的上行传输通过 SCG 传输的限制，或者挂起 MCG 重复 SRB2 的 SCG 传输，或者释放 MCG 重复 SRB2 上行传输配置。

示例实现 3

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 的 SCG 传输和/或分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 下行传输）；B. 将所有 MCG 重复 SRB 重配置为通过 MCG 进行上行传输或者，重配置所有 MCG 重复 SRB 的 PDCP 实体以释放将分离 SRB 的数据(或上行数据)通过 SCG 传输的限制；或者，释放 MCG 重复 SRB 上行传输配置；C. 重置（reset）SCG-MAC；D. 停止用于监测改变 SCG 失败的定时器 T307；E. 启动 SCGFailureInformation 消息的传输过程，所述 SCGFailureInformation 消息采用 MCG 传输。

示例实现 4

用户设备 UE 检测到 SCG 失效，如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG，则认为检测到了 MCG 的无线链路失效，启动 MCG 发生无线链路失效时应执行的相关过程。

可选地，对于上述用于配置 MCG 重复 SRB1 的实施例，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时是否触发 MCG 无线链路失效。当所述指示标识指示当 SCG 失效时触发 MCG 无线链路失效时，则如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG，认为检测到了 MCG 的无线链路失效，启动发生无线链路失效时应执行的相关过程。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时触发 MCG 无线链路失效。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不触发

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MCG 无线链路失效。反之亦然。

可选地，对于上述用于配置 MCG 重复 SRB1 的实施例，如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG 或 MCG 和 SCG，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时是否触发 MCG 无线链路失效。当所述指示标识指示当 SCG 失效时触发 MCG 无线链路失效时，则如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG 或 MCG 和 SCG，认为检测到了 MCG 的无线链路失效，启动发生无线链路失效时应执行的相关过程。

示例实现 5

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 的 SCG 传输和/或分离 SRB 的 SCG 传输（或分离 SRB 的 SCG 下行传输）；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureInformation 消息的传输过程，采用 UL-CCCH 传输 SCGFailureInformation 消息或采用 UL-CCCH（即 SRB0）进行上行传输。

可选的，对于上述用于配置 MCG 重复 SRB1 的实施例，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时，是否采用 UL-CCCH 传输 SCGFailureInformation 消息或进行上行传输。如果所述指示标识的取值对应当 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息，才可以在 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不采用 UL-CCCH 传输 SCGFailureInformation 消息或触发 MCG 无线链路失效。反之亦然。

可选的，对于上述用于配置 MCG 重复 SRB1 的实施例，如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG 或 MCG 和 SCG，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时，是否采用 UL-CCCH 传输 SCGFailureInformation 消息。如果所述指示标识的取值对应当 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息，才可以在 SCG 失

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效时采用 UL-CCCH 传输 SCGFailureInformation 消息。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时采用 UL-CCCH 传输 SCGFailureInformation 消息。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不采用 UL-CCCH 传输 SCGFailureInformation 消息或触发 MCG 无线链路失效。反之亦然。

示例实现 6

SCG 失效信息过程包括以下操作中的至少一项：A. 挂起所有 SCG DRB 和挂起分离 DRB 的 SCG 传输和/或分离 SRB 的 SCG 传输(或分离 SRB 的 SCG 下行传输)；B. 重置 SCG-MAC；C. 停止用于监测改变 SCG 失败的定时器 T307；D. 启动传输 SCGFailureReport 消息的传输过程，所述消息用于指示 SCG 失效或用于请求基站重配置 MCG 重复 SRB 或用于提供 UE 检测到的错误信息，采用 UL-CCCH 传输 SCGFailureReport 消息或采用 UL-CCCH（即 SRB0）进行上行传输。可选的，如果 SCGFailureInformation 消息或所述消息包含的内容没有在 SCGFailureReport 消息中传输，UE 接收到来自基站的用于重配置 MCG 重复 SRB 的上行传输的消息后，启动传输 SCGFailureInformation 消息的传输过程，利用重配置的 MCG 重复 SRB 的上行传输传输 SCGFailureInformation 消息。

可选的，对于上述用于配置 MCG 重复 SRB1 的实施例，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时，是否采用 UL-CCCH 传输 SCGFailureReport 消息或进行上行传输。如果所述指示标识的取值对应当 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息，才可以在 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息；否则，不采用 UL-CCCH 传输 SCGFailureReport 消息或触发 MCG 无线链路失效。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不采用 UL-CCCH 传输 SCGFailureReport 消息或触发 MCG 无线链路失效。反之亦然。

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可选的，对于上述用于配置 MCG 重复 SRB1 的实施例，如果 MCG 重复 SRB1 的上行传输被配置为采用 SCG 或 MCG 和 SCG，RRC 信令还包含一个指示标识，用于指示当 SCG 失效时，是否采用 UL-CCCH 传输 SCGFailureReport 消息。如果所述指示标识的取值对应当 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息，才可以在 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息；否则，不采用 UL-CCCH 传输 SCGFailureReport 消息或触发 MCG 无线链路失效。例如，所述指示标识的取值为“1”或“TRUE”或“setup”或所述指示标识出现，则 SCG 失效时采用 UL-CCCH 传输 SCGFailureReport 消息。当所述指示标识的取值为“0”或“FALSE”或“release”或所述指示标识不出现，则 SCG 失效时不采用 UL-CCCH 传输 SCGFailureReport 消息或触发 MCG 无线链路失效。反之亦然。

需要说明的是，本公开中所示用于配置 MCG 重复 SRB1 的实施例也适用于配置 MCG 重复 SRB2，只要将各示例中的 SRB1 替换为 SRB2 即可。

需要说明的是，如果 MCG 重复 SRB2 被配置为上行采用 SCG，则当 SCG 失效时，上述 SCG 失效信息过程实施例中操作还可以包括：将 MCG 重复 SRB2 重配置为通过 MCG 进行上行传输。

与上述方法 300 相对应，本公开提供了一种用户设备 UE。图 4 示出了根据本公开实施例的 UE 400 的框图。UE 400 被配置有主小区组 MCG 重复信令无线承载 SRB，所述 MCG 重复 SRB 与主小区组 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输。如图所示，UE 400 包括：收发机 410、处理器 420 和存储器 430，所述处理器 430 存储所述处理器 420 可执行的指令，使得所述基站 400 执行以上结合图 3 描述的方法 300。

具体地，所述处理器 430 存储所述处理器 420 可执行的指令，使得 UE 400：检测到 SCG 失效；以及将所述 MCG 重复 SRB 重配置为通过 MCG 进行上行传输，或触发 MCG 失效。

在一个示例中，所述 UE 400 还被配置有另一 MCG 重复 SRB。所述处理器 430 还存储所述处理器 420 可执行的指令，使得 UE 400 在检测

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到 SCG 失效之后：将所述另一 MCG 重复 SRB 重配置为通过 MCG 进行上行传输。

在一个示例中，所述处理器 430 还存储所述处理器 420 可执行的指令，使得 UE 400：向基站报告 SCG 失效，其中，向基站报告 SCG 失效包括：利用重配置的 MCG 重复 SRB，通过 MCG 向基站发送 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 向基站发送 SCG 失效信息。

在一个示例中，所述处理器 430 还存储所述处理器 420 可执行的指令，使得 UE 400：从基站接收指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输，其中，所述重配置仅在所述指示信息指示在 SCG 失效时通过 MCG 进行上行传输的情况下执行。

本公开还提供了一种基站中的方法。图 5 是示出了根据本公开实施例的基站中的方法 500 的流程图。所述基站是主小区组 MCG 基站，通过 MCG 重复信令无线承载 SRB 与用户设备 UE 通信，所述 MCG 重复 SRB 与 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输。如图所示，方法 500 包括以下步骤。

在步骤 S510，从所述 UE 接收辅小区组 SCG 失效的报告。

在步骤 S520，将所述 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在一个示例中，所述接收 SCG 失效的报告包括：利用重配置的 MCG 重复 SRB，通过 MCG 接收 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 接收 SCG 失效信息。

在一个示例中，所述基站还通过另一 MCG 重复 SRB 与所述 UE 通信，所述方法 500 还包括：将所述另一 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在一个示例中，所述方法 500 还包括：向所述 UE 发送指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。

以上结合方法 300 所描述的各个示例，尤其是示例实现 1～6，也适用于方法 500。

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与上述方法 500 相对应，本公开提供了一种基站。图 6 示出了根据本公开实施例的基站 600 的框图。所述基站是主小区组 MCG 基站，通过 MCG 重复信令无线承载 SRB 与用户设备 UE 通信，所述 MCG 重复 SRB 与 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输。如图所示，基站 600 包括：收发机 610、处理器 620 和存储器 630，所述处理器 630 存储所述处理器 620 可执行的指令，使得所述基站 600 执行以上结合图 5 描述的方法 500。

具体地，所述处理器 630 存储所述处理器 620 可执行的指令，使得基站 600 从所述 UE 接收辅小区组 SCG 失效的报告；以及将所述 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在一个示例中，所述接收 SCG 失效的报告包括：利用重配置的 MCG 重复 SRB，通过 MCG 接收 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 接收 SCG 失效信息。

在一个示例中，所述基站还通过另一 MCG 重复 SRB 与所述 UE 通信，所述处理器 630 还存储所述处理器 620 可执行的指令，使得基站 600：将所述另一 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

在一个示例中，所述处理器 630 存储所述处理器 620 可执行的指令，使得基站 600：向所述 UE 发送指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。

运行在根据本发明的设备上的计算机可执行指令或者程序可以是通过控制中央处理单元（CPU）来使计算机实现本发明的实施例功能的程序。该程序或由该程序处理的信息可以临时存储在易失性存储器（如随机存取存储器 RAM）、硬盘驱动器（HDD）、非易失性存储器（如闪速存储器）、或其他存储器系统中。

用于实现本发明各实施例功能的计算机可执行指令或程序可以记录在计算机可读存储介质上。可以通过使计算机系统读取记录在所述记录介质上的程序并执行这些程序来实现相应的功能。此处的所谓“计算机系统”可以是嵌入在该设备中的计算机系统，可以包括操作系统或硬件（如外围设备）。“计算机可读存储介质”可以是半导体记录介质、光学记录介质、磁性记录介质、短时动态存储程序的记录介质、或计算机可

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读的任何其他记录介质。

用在上述实施例中的设备的各种特征或功能模块可以通过电路（例如，单片或多片集成电路）来实现或执行。设计用于执行本说明书所描述的功能的电路可以包括通用处理器、数字信号处理器（DSP）、专用集成电路（ASIC）、现场可编程门阵列（FPGA）、或其他可编程逻辑器件、分立的门或晶体管逻辑、分立的硬件组件、或上述器件的任意组合。通用处理器可以是微处理器，也可以是任何现有的处理器、控制器、微控制器、或状态机。上述电路可以是数字电路，也可以是模拟电路。因半导体技术的进步而出现了替代现有集成电路的新的集成电路技术的情况下，本发明的一个或多个实施例也可以使用这些新的集成电路技术来实现。

此外，本发明并不局限于上述实施例。尽管已经描述了所述实施例的各种示例，但本发明并不局限于此。安装在室内或室外的固定或非移动电子设备可以用作终端设备或通信设备，如 AV 设备、厨房设备、清洁设备、空调、办公设备、自动贩售机、以及其他家用电器等。

如上，已经参考附图对本发明的实施例进行了详细描述。但是，具体的结构并不局限于上述实施例，本发明也包括不偏离本发明主旨的任何设计改动。另外，可以在权利要求的范围内对本发明进行多种改动，通过适当地组合不同实施例所公开的技术手段所得到的实施例也包含在本发明的技术范围内。此外，上述实施例中所描述的具有相同效果的组件可以相互替代。

AT&T, et al. Ex. 1002 p. 55 of 393 DAINGEAN_0004213

权 利 要 求

1. 一种用户设备 UE 中的方法，所述 UE 被配置有主小区组 MCG 重复信令无线承载 SRB，所述 MCG 重复 SRB 与主小区组 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输，所述方法包括：

检测到 SCG 失效；以及

将所述 MCG 重复 SRB 重配置为通过 MCG 进行上行传输，或触发 MCG 失效。

2. 根据权利要求 1 所述的方法，其中，所述 UE 还被配置有另一 MCG 重复 SRB，所述方法还包括，在检测到 SCG 失效之后：

将所述另一 MCG 重复 SRB 重配置为通过 MCG 进行上行传输。

3. 根据权利要求 1 所述的方法，还包括：

向基站报告 SCG 失效，

其中，向基站报告 SCG 失效包括：

利用重配置的 MCG 重复 SRB，通过 MCG 向基站发送 SCG 失效信息，或

利用 MCG SRB 通过公共控制信道 CCCH 向基站发送 SCG 失效信息。

4. 根据权利要求 1 所述的方法，还包括：

从基站接收指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输，

其中，所述重配置仅在所述指示信息指示在 SCG 失效时通过 MCG 进行上行传输的情况下执行。

5. 一种用户设备 UE，包括收发机、处理器和存储器，所述处理器存储所述处理器可执行的指令，使得所述 UE 执行根据权利要求 1-4 中任一项所述的方法。

6. 一种基站中的方法，所述基站是主小区组 MCG 基站，通过 MCG 重复信令无线承载 SRB 与用户设备 UE 通信，所述 MCG 重复 SRB 与 MCG 和辅小区组 SCG 相关联并被配置为通过 SCG 进行上行传输，所述方法包括：

从所述 UE 接收辅小区组 SCG 失效的报告；以及

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将所述 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

7. 根据权利要求 6 所述的方法，其中，所述接收 SCG 失效的报告包括：

利用重配置的 MCG 重复 SRB，通过 MCG 接收 SCG 失效信息，或利用 MCG SRB 通过公共控制信道 CCCH 接收 SCG 失效信息。

8. 根据权利要求 6 所述的方法，其中，所述基站还通过另一 MCG 重复 SRB 与所述 UE 通信，所述方法还包括：

将所述另一 MCG 重复 SRB 重配置为通过 MCG 接收上行传输。

9. 根据权利要求 6 所述的方法，还包括：

向所述 UE 发送指示信息，所述指示信息指示 UE 在 SCG 失效时是否通过 MCG 进行上行传输。

10. 一种基站，包括收发机、处理器和存储器，所述处理器存储所述处理器可执行的指令，使得所述基站执行根据权利要求 6-9 中任一项所述的方法。

AT&T, et al. Ex. 1002 p. 57 of 393 DAINGEAN_0004215

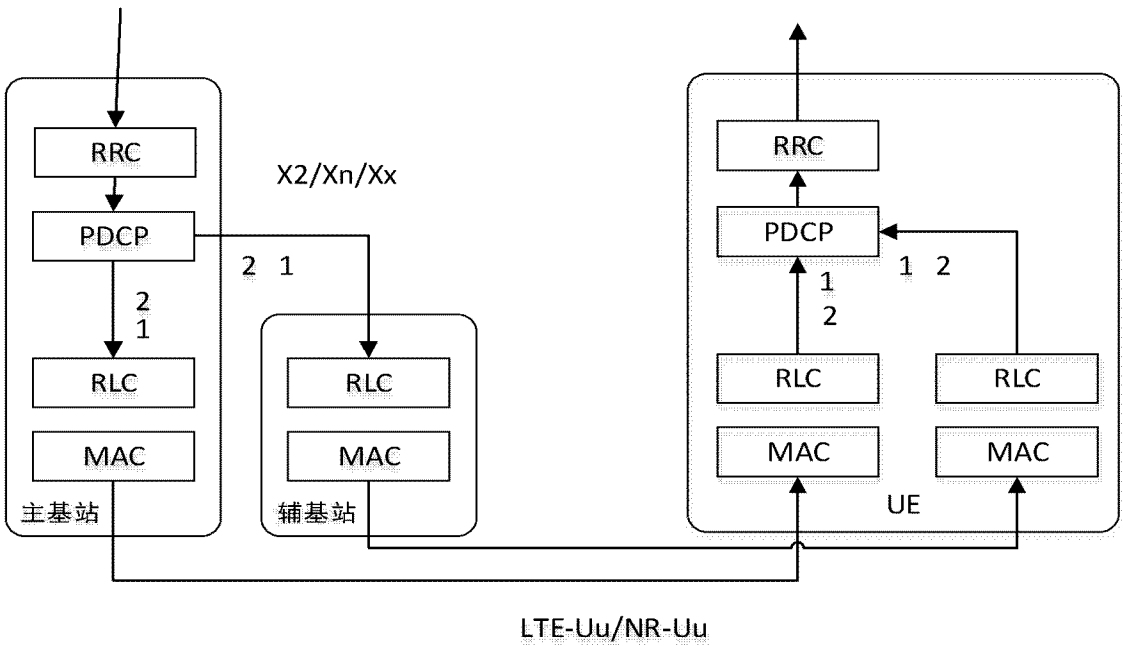


图1

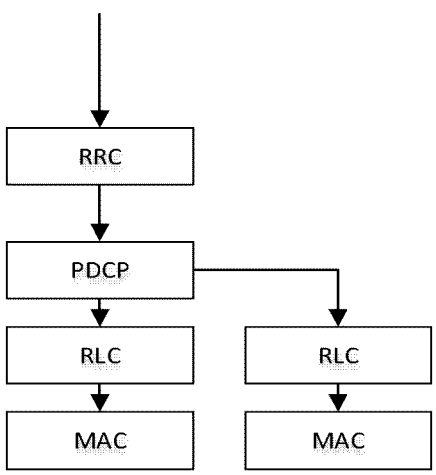


图2

DAINGEAN_0004216

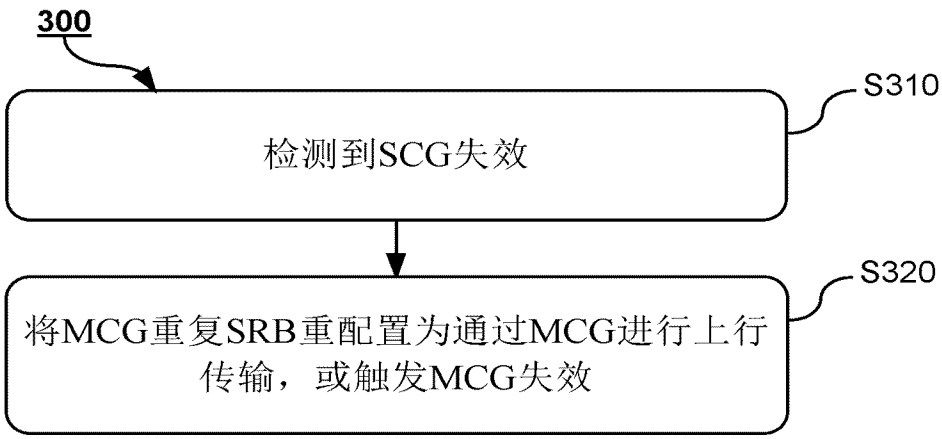

300
S310
检测到SCG失效
S320
将MCG重复SRB重配置为通过MCG进行上行传输，或触发MCG失效

图3

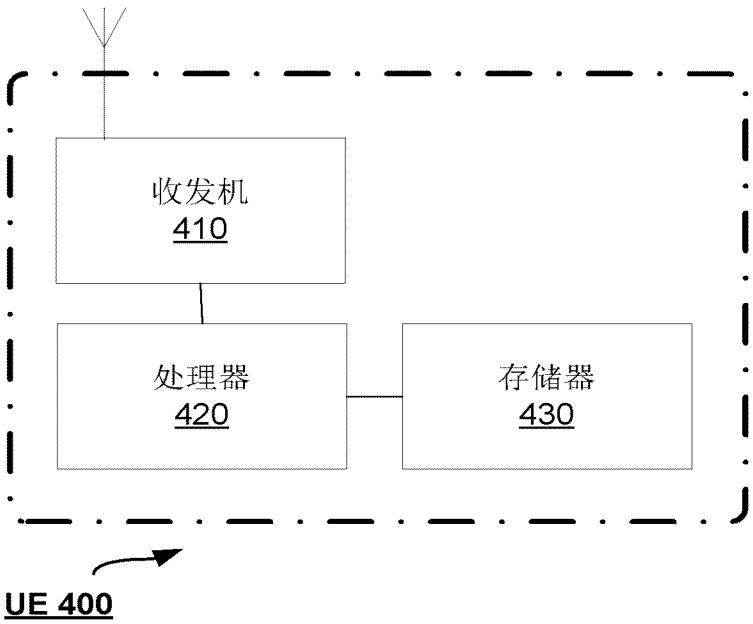

收发机
410
处理器
420
存储器
430
UE 400

图4

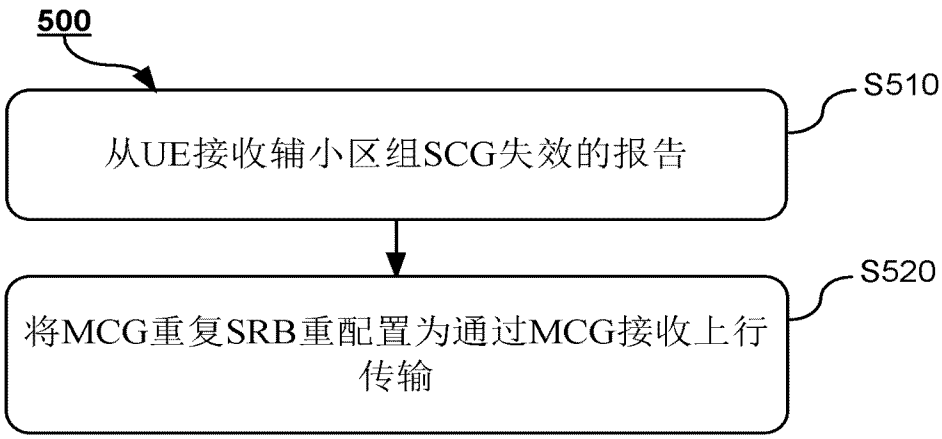

500
S510
从UE接收辅小区组SCG失效的报告
S520
将MCG重复SRB重配置为通过MCG接收上行传输

图5

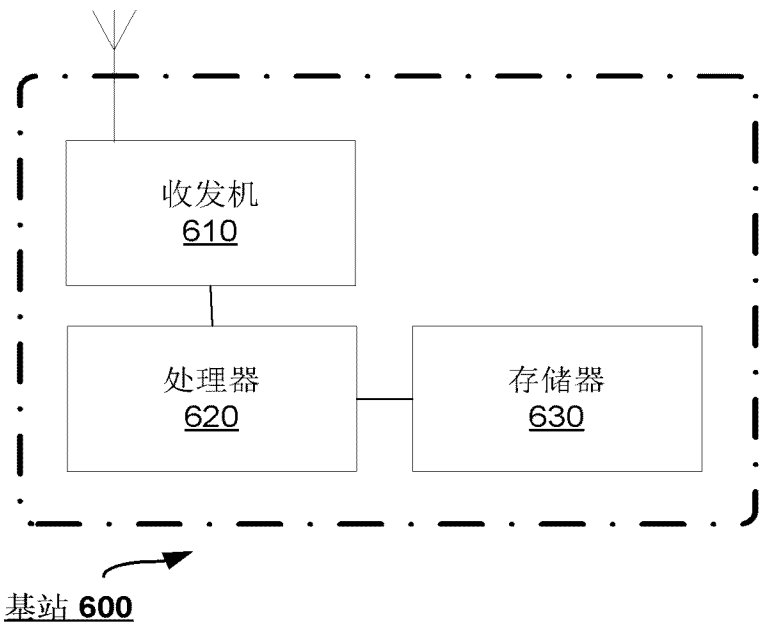

收发机
610
处理器
620
存储器
630
基站 600

图6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2018/099379

A. CLASSIFICATION OF SUBJECT MATTER

H04W 24/02(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

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)

CNPAT; CNKI; WPI; EPODOC; 3GPP: 主小区, 辅小区, 次小区, 主载波, 辅载波, 群, 集合, 信令, 无线承载, 重复, 复制, 失效, 无效, 故障, 错, MCG, SCG, SRB, duplicated, repeat, failure, invalidation, uplink, report

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NOKIA et al. "Further Considerations for SCG SRB and RLF Handling" *3GPP TSG-RAN WG2 NR Adhoc #2 R2-1706857,* 29 June 2017 (2017-06-29), main body, sections 1-2	1-10
A	ZTE. "Configuration of SCG SRB and Split & Duplicated SRB" *3GPP TSG-RAN WG3#Ad-hoc R3-172053,* 29 June 2017 (2017-06-29), entire document	1-10
A	CN 105684496 A (LG ELECTRONICS INC.) 15 June 2016 (2016-06-15) entire document	1-10
A	WO 2016064334 A1 (TELEFONAKTIEBOLAGET L M ERICSSONPUBL) 28 April 2016 (2016-04-28) entire document	1-10

☐ Further documents are listed in the continuation of Box C.

☑ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"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	Date of mailing of the international search report
12 October 2018	**29 October 2018**

Name and mailing address of the ISA/CN	Authorized officer
State Intellectual Property Office of the P. R. China **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing** **100088** **China**	
Facsimile No. **(86-10)62019451**	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

DAINGEAN_0004219

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2018/099379

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	105684496	A	15 June 2016	US	2018070259	A1	08 March 2018
				WO	2015060543	A1	30 April 2015
				KR	20160073962	A	27 June 2016
				US	2016242064	A1	18 August 2016
WO	2016064334	A1	28 April 2016	AU	2015337123	A1	04 May 2017
				EP	3210430	A1	30 August 2017
				US	2016302256	A1	13 October 2016
				RU	2661538	C1	17 July 2018
				US	2018184482	A1	28 June 2018
				BR	112017008031	A2	23 January 2018
				JP	2017531961	A	26 October 2017
				CN	107079514	A	18 August 2017

Form PCT/ISA/210 (patent family annex) (January 2015)

DAINGEAN_0004220

国际检索报告

国际申请号
PCT/CN2018/099379

A. 主题的分类

H04W 24/02(2009.01)i

按照国际专利分类(IPC)或者同时按照国家分类和IPC两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

H04W; H04Q

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用））

CNPAT, CNKI, WPI, EPODOC, 3GPP: 主小区, 辅小区, 次小区, 主载波, 辅载波, 群, 集合, 信令, 无线承载, 重复, 复制, 失效, 无效, 故障, 错, MCG, SCG, SRB, duplicated, repeat, failure, invalidation, uplink, report

C. 相关文件

类 型*	引用文件，必要时，指明相关段落	相关的权利要求
X	Nokia et al. "Further considerations for SCG SRB and RLF handling" 3GPP TSG-RAN WG2 NR Adhoc #2 R2-1706857, 2017年 6月 29日 (2017-06-29), 正文第1-2节	1-10
A	ZTE. "Configuration of SCG SRB and Split&Duplicated SRB" 3GPP TSG-RAN WG3#Ad-hoc R3-172053, 2017年 6月 29日 (2017-06-29), 全文	1-10
A	CN 105684496 A (LG电子株式会社) 2016年 6月 15日 (2016-06-15) 全文	1-10
A	WO 2016064334 A1 (TELEFONAKTIEBOLAGET L M ERICSSONPUBL) 2016年 4月 28日 (2016-04-28) 全文	1-10

☐ 其余文件在C栏的续页中列出。

☑ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
2018年 10月 12日	2018年 10月 29日
ISA/CN的名称和邮寄地址 中华人民共和国国家知识产权局(ISA/CN) 中国北京市海淀区蓟门桥西土城路6号 100088 传真号 (86-10)62019451	受权官员 文娟 电话号码 86-10-53961609

表 PCT/ISA/210 (第2页) (2015年1月)

DAINGEAN_0004221

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2018/099379

检索报告引用的专利文件			公布日（年/月/日）	同族专利			公布日（年/月/日）
CN	105684496	A	2016年 6月 15日	US	2018070259	A1	2018年 3月 8日
				WO	2015060543	A1	2015年 4月 30日
				KR	20160073962	A	2016年 6月 27日
				US	2016242064	A1	2016年 8月 18日
WO	2016064334	A1	2016年 4月 28日	AU	2015337123	A1	2017年 5月 4日
				EP	3210430	A1	2017年 8月 30日
				US	2016302256	A1	2016年 10月 13日
				RU	2661538	C1	2018年 7月 17日
				US	2018184482	A1	2018年 6月 28日
				BR	112017008031	A2	2018年 1月 23日
				JP	2017531961	A	2017年 10月 26日
				CN	107079514	A	2017年 8月 18日

表 PCT/ISA/210（同族专利附件）（2015年1月）

DAINGEAN_0004222

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 01/31/2018. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	
Filing Date	
First Named Inventor	FANGYING XIAO
Title	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
Art Unit	
Examiner Name	
Attorney Docket Number	US80118

SIGNATURE of Applicant or Patent Practitioner

Signature	/Kyoko C. Makino/	Date (Optional)	2020-02-07
Name	Kyoko C. Makino	Registration Number	72200
Title (if Applicant is a juristic entity)	Patent Practitioner		
Applicant Name (if Applicant is a juristic entity)	SHARP KABUSHIKI KAISHA		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
Approved for use through 11/30/2014. OMB 0651-0051
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 145688

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

SHARP KABUSHIKI KAISHA

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	/Mototaka Taneya/	Date (Optional)	
Name	Mototaka Taneya		
Title	MANAGING OFFICER BU PRESIDENT CORPORATE RESEARCH & DEVELOPMENT		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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DAINGEAN_0004224

Doc code: IDS
Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (03-15)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	XIAO, Fangying
Art Unit	
Examiner Name	
Attorney Docket Number	US80118

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	XIAO, Fangying
	Art Unit	
	Examiner Name	
	Attorney Docket Number	US80118

	1	NOKIA, ALCATEL-LUCENT SHANGHAI BELL: "Further considerations for SCG SRB and RLF handling", R2-1706857, 3GPP TSG-RAN WG2 NR Adhoc #2, Qingdao, China, 27 - 29 June 2017
	2	NTT DOCOMO: "New SID Proposal: Study on New Radio Access Technology", RP-160671, 3GPP TSG RAN Meeting #71, Göteborg, Sweden, 7.-10. March, 2016

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CERTIFICATION STATEMENT

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Signature	/ Kyoko C. Makino /	Date (YYYY-MM-DD)	2020-02-07
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USER EQUIPMENT, BASE STATION, AND RELATED METHODS

TECHNICAL FIELD

The present disclosure relates to the field of wireless communications technologies. More specifically, the present disclosure relates to user equipment, a base station, and a method related to an SCG failure.

BACKGROUND

A new research project on 5G technical standards (see non-patent literature: RP-160671: New SID Proposal: Study on New Radio Access Technology) was proposed by NTT DOCOMO at the 3rd Generation Partnership Project (3GPP) RAN#71 plenary meeting held in March 2016, and was approved. The goal of the research project is to develop a New Radio (NR) access technology to meet all of the application scenarios, requirements, and deployment environments of 5G. NR mainly has three application scenarios: Enhanced Mobile Broadband Communications (eMBB), massive Machine Type Communications (mMTC), and Ultra Reliable and Low Latency Communications (URLLC).

In the 3GPP RAN2 #96 meeting held in October 2016, it was agreed that research will be carried out on multi-connectivity (including dual-connectivity) so as to meet the URLLC reliability requirement. The multi-connectivity may adopt a mechanism such as packet duplication or link selection. In the 3GPP NR AdHoc meeting held in January 2017, it was agreed that an NR-PDCP entity supports a packet duplication function of a user plane and a data plane, wherein the function of a transmitting PDCP entity is to support packet duplication, while the function of a receiving PDCP entity is to support duplicate discarding. In the 3GPP NR AdHoc meeting held in June 2017, it was agreed that in a dual-connectivity scenario, a master base station decides whether to use a Master

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Cell Group (MCG) duplicated Signaling Radio Bearer (SRB) and configure the MCG duplicated SRB via Radio Resource Control (RRC) signaling of the master base station. In addition, in this meeting it was also agreed that in a dual-connectivity scenario, for the MCG duplicated SRB, whether uplink transmission is performed by adopting an MCG, a Secondary Cell Group (SCG), or both the MCG and the SCG in a duplicate transmission mode is configured via RRC signaling.

In light of the aforementioned points, it is desirable to solve problems related to occurrence of an SCG failure when RRC signaling configures, for an MCG duplicated SRB, uplink transmission to adopt an SCG in a dual-connectivity scenario supporting packet duplication.

SUMMARY

According to a first aspect of the present disclosure, a method used in User Equipment (UE) is provided, the UE being configured with a Master Cell Group (MCG) duplicated Signaling Radio Bearer (SRB), the MCG duplicated SRB being associated with an MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, and the method comprising: detecting an SCG failure; and reconfiguring the MCG duplicated SRB to be used for uplink transmission via the MCG, or triggering an MCG failure.

In an embodiment, the UE is further configured with another MCG duplicated SRB, and the method further comprises, after the SCG failure is detected: reconfiguring the other MCG duplicated SRB to be used for uplink transmission via the MCG.

In an embodiment, the method further comprises: reporting the SCG failure to a base station, wherein the reporting the SCG failure to a base station comprises:

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transmitting the SCG failure information to the base station via the MCG by using the reconfigured MCG duplicated SRB, or transmitting the SCG failure information to the base station through a Common Control Channel (CCCH) by using the MCG SRB.

In an embodiment, the method further comprises: receiving from the base station instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails, wherein the reconfiguration is performed only when the instruction information instructs to perform uplink transmission via the MCG when the SCG fails.

According to a second aspect of the present invention, User Equipment (UE) is provided, comprising a transceiver, a processor, and a memory, the processor storing instructions executable by the processor to cause the UE to perform the method according to the above first aspect.

According to a third aspect of the present disclosure, a method used in a base station is provided, the base station being a Master Cell Group (MCG) base station and communicating with User Equipment (UE) over an MCG duplicated Signaling Radio Bearer (SRB), the MCG duplicated SRB being associated with the MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, and the method comprising: receiving from the UE a report on an SCG failure; and reconfiguring the MCG duplicated SRB to receive uplink transmission via the MCG.

In an embodiment, the receiving a report on an SCG failure comprises: receiving the SCG failure information via the MCG by using the reconfigured MCG duplicated SRB, or receiving the SCG failure information through a Common Control Channel (CCCH) by using the MCG SRB.

In an embodiment, the base station further communicates with the UE over another MCG duplicated SRB, and the method further comprises: reconfiguring the other MCG duplicated SRB to receive uplink transmission via the MCG.

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In an embodiment, the method further comprises: transmitting to the UE instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails.

According to a fourth aspect of the present disclosure, a base station is provided, comprising a transceiver, a processor, and a memory, the processor storing instructions executable by the processor to cause the base station to perform the method according to the above third aspect.

DESCRIPTION OF THE DRAWINGS

The above and other features of the present disclosure will become more apparent with the following detailed description in conjunction with the accompanying drawings.

FIG. 1 is a schematic diagram illustrating data transmission over an MCG duplicated SRB;

FIG. 2 is a schematic diagram of a protocol architecture in User Equipment (UE);

FIG. 3 is a flowchart of a method used in user equipment according to an embodiment of the present disclosure;

FIG. 4 is a block diagram of user equipment according to an embodiment of the present disclosure;

FIG. 5 is a flowchart of a method used in a base station according to an embodiment of the present disclosure; and

FIG. 6 is a block diagram of a base station according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

The following describes the present disclosure in detail with reference to the accompanying drawings and specific embodiments. It should be noted that the present

disclosure should not be limited to the specific embodiments described below. In addition, for simplicity, detailed description of the known art not directly related to the present disclosure is omitted to prevent confusion in understanding the present disclosure.

Some terms involved in the present disclosure are described below. If not specifically indicated, the terms involved in the present disclosure use the definitions herein. The terms given in the present disclosure may be named differently in NR, LTE, and eLTE, but unified terms are used in the present disclosure. When applied to a specific system, the terms may be replaced with terms used in the corresponding system.

RRC: Radio Resource Control

PDCP: Packet Data Convergence Protocol. In the present disclosure, if not specifically indicated, the PDCP may represent a PDCP in NR or LTE or eLTE.

RLC: Radio Link Control. In the present disclosure, if not specifically indicated, the RLC may represent RLC in NR or LTE or eLTE. A transmission mode of an RLC entity may be configured as one of the following: a Transparent Mode (TM), an Unacknowledged Mode (UM), or an Acknowledged Mode (AM).

MAC: Medium Access Control. In the present disclosure, if not specifically indicated, the MAC may represent a MAC entity in NR or LTE or eLTE.

CCCH: Common Control Channel.

PDU: Protocol Data Unit.

SDU: Service Data Unit.

In the present disclosure, data received from or transmitted to an upper layer is referred to as an SDU; data transmitted to or received from a lower layer is referred to as a PDU. For example, data received from or transmitted to an upper layer by a PDCP entity is referred to as a PDCP SDU, and data received from or transmitted to an RLC entity by the PDCP entity is referred to as a PDCP PDU (i.e., an RLC SDU).

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Master Base Station: Master eNB or Master gNB, denoted as MeNB (a base station corresponding to E-UTRAN or LTE or eLTE) or MgNB (a base station corresponding to 5G-RAN or NR). The master base station is an eNB that at least terminates at a control node mobility management entity (which can be denoted as S1-MME) for processing interaction between UE and a core network in dual-connectivity; or a gNB that at least terminates at an NG-C, wherein the NG-C is a control plane interface between an NG-RAN an a 5GC.

Secondary Base Station: Secondary eNB or Secondary gNB, denoted as SeNB (a base station corresponding to E-UTRAN or LTE or eLTE) or SgNB (a base station corresponding to 5G-RAN or NR). The secondary base station is a base station that does not serve as a master base station, but provides additional radio resources for UE in dual-connectivity.

Primary Cell: Primary Cell (PCell). The PCell is a cell that operates on a primary frequency, and may be a cell on which UE performs an initial connection establishment procedure or initiates a connection re-establishment procedure or which is designated as a primary cell during a handover procedure. The cell in the present disclosure may also be referred to as a carrier or a set of beams.

Primary Secondary Cell: Primary Secondary Cell (PSCell). The PSCell is an SCG cell used to instruct UE to perform random access during an SCG switching procedure.

Secondary Cell: Secondary Cell (SCell). The SCell is a cell that operates on a secondary frequency. The cell can be configured after an RRC connection is established and can be used to provide additional radio resources.

Cell Group: Cell Group, CG. The CG is a group of serving cells or carriers associated with a master base station or a secondary base station in dual-connectivity or multi-connectivity.

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Master Cell Group: Master Cell Group (MCG). For UE not configured with multi-connectivity, the MCG consists of all serving cells; for UE configured with multi-connectivity, the MCG consists of a subset of serving cells (i.e., a group of serving cells associated with a master base station) comprising a PCell and 0, 1, or a plurality of SCells.

Secondary Cell Group: Secondary Cell Group (SCG). The SCG is a group of serving cells associated with an SeNB or an SgNB in dual-connectivity. The SCG may comprise one PSCell, and may further comprise one or a plurality of SCells.

Dual-Connectivity: In NR, UE in an RRC connected state is configured to utilize resources provided by two different schedulers respectively located in base stations connected by a non-ideal backhaul. In LTE/LTE-A/eLTE, UE in an RRC connected state is configured with one MCG and one SCG; in other words, UE with two receivers and/or transmitters in a connected state is configured to use two EUTRAN radio resources provided by two different schedulers that may be connected by a non-ideal backhaul. A dual-connectivity data transmission mode comprises, but is not limited to, data duplication and link selection. The link selection transmission mode refers to that the same data or PDCP PDU or PDCP SDU is transmitted in one cell group in two cell groups or radio resources provided by the two cell groups configured for the UE.

DRB: Data Radio Bearer carrying user plane data, also referred to as data bearer for short.

Split DRB: A DRB of which a wireless protocol is located at a master base station and a secondary base station and which simultaneously utilizes resources provided by the master base station and the secondary base station in LTE/LTE-A/eLTE in dual-connectivity. If a PDCP entity of the split DRB is located in a master base station (namely, data arrives at the master base station first and is forwarded by the master base station to a secondary base station to split the data in the master base station), then the

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split DRB is referred to as an MCG split DRB; if a PDCP entity of the split DRB is located in a secondary base station (namely, data arrives at the secondary base station first and is forwarded by the secondary base station to a master base station to split the data in the secondary base station), then the split DRB is referred to as an SCG split DRB. If not specifically indicated, the split DRB in the present disclosure may be an MCG split DRB or an SCG split DRB. The embodiments of the present disclosure are also applicable to scenarios where the MCG split DRB and the SCG split DRB are not distinguished.

SRB: Signaling Radio Bearer. The bearer may be used for transmitting an RRC message and a NAS message or for transmitting only an RRC message and a NAS message. The SRB may comprise SRB0, SRB1, SRB1bis, and SRB2. SRB0 is used for an RRC message using a CCCH logical channel; SRB1 is used for an RRC message using a DCCH logical channel, wherein the RRC message may comprise a NAS message, and SRB1 is also used for transmitting a NAS message before SRB2 is established. SRB1bis is used for an RRC message and a NAS message using a DCCH logical channel prior to secure activation, where the RRC message may include a NAS message. SRB2 is used for an RRC message and a NAS message using a DCCH logical channel, where the RRC message comprises recorded measurement information (or referred to as a measurement log). An SRB can be either an MCG SRB or an SCG SRB. The bearer in the present disclosure may be an SRB or a DRB.

Split SRB: An SRB of which a wireless protocol is located at a master base station and a secondary base station and which simultaneously utilizes resources provided by the master base station and the secondary base station in LTE/LTE-A/eLTE in dual-connectivity. If a PDCP entity and/or RRC of the split SRB is located in a master base station (namely, signaling, also referred to as data, is forwarded by the master base station to a secondary base station to split the signaling in the master base station), then

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the split SRB is referred to as an MCG split SRB; if a PDCP entity and/or RRC of the split SRB is located in a secondary base station (namely, signaling, also referred to as data, is forwarded by the secondary base station to a master base station to split the signaling in the secondary base station), then the split SRB is referred to as an SCG split SRB.

In dual-connectivity, if a wireless protocol of a bearer is split in a master base station and belongs to an MCG and an SCG, then the bearer is referred to as an SCG split bearer. The SCG split bearer may be an MCG split DRB or an MCG split SRB.

In dual-connectivity, in NR, if a wireless protocol of a bearer is split in a secondary base station and belongs to an MCG and an SCG, the bearer is referred to as an SCG split bearer. The SCG split bearer may be an SCG split DRB or an SCG split SRB.

If not specifically indicated, the split SRB in the present disclosure may be an MCG split SRB or an SCG split SRB. The embodiments of the present disclosure are also applicable to scenarios in which the MCG split SRB and the SCG split SRB are not distinguished. The split SRB may be configured to be used for transmission in a packet duplication or link selection mode.

In the present disclosure, the split bearer may comprise: an MCG split DRB, an MCG split SRB, an SCG split DRB, and an SCG split SRB.

Packet Duplication: Also referred to as duplication or data duplication. Both an SRB and a DRB may be configured with packet duplication. When a radio bearer (including an SRB and a DRB) is configured with packet duplication, a secondary RLC entity and a secondary logical channel are added for the radio bearer to process duplicate PDCP PDUs. PDCP packet duplication refers to that the same PDCP PDU is transmitted twice or a plurality of times, once in an original RLC entity, and once in a secondary RLC entity. The PDCP PDU transmitted twice is not transmitted on the same carrier. In a

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dual-connectivity mode, two logical channels of the radio bearer configured with packet duplication belong to different MAC entities.

Packet Duplication Split Bearer: A split bearer configured with packet duplication in a dual-connectivity mode. In the transmission mode, the same data is transmitted over two wireless protocols of a split bearer, which may comprise an MCG packet duplication split SRB, an SCG packet duplication split SRB, an MCG packet duplication split DRB, and an SCG packet duplication split DRB. If the packet duplication split bearer is an MCG packet duplication split bearer, then a PDCP entity located in a master base station or an MCG is responsible for packet duplication and/or packet discarding; if the packet duplication split bearer is an SCG packet duplication split bearer, then a PDCP entity located in a secondary base station or an SCG is responsible for packet duplication and/or packet de-duplication.

FIG. 1 is a schematic diagram illustrating downlink transmission of an MCG packet duplication split SRB between a base station and User Equipment (UE) in dual-connectivity. It should be understood that uplink transmission of the MCG packet duplication split SRB between the base station and the UE can adopt the same protocol architecture, except that data is transmitted from the UE to the base station, that is, the arrows in FIG. 1 are reversed. As shown in FIG. 1, data (for example, a PDCP PDU) is transmitted over two wireless protocols (corresponding to two RLC entities associated with the same PDCP entity) of the split SRB by using resources of a master base station and a secondary base station. In the dual-connectivity mode, corresponding to the split SRB configured with packet duplication, each PDCP PDU is transmitted to a receiving party via two RLC entities. An interface between the master base station and the secondary base station may be denoted as Xn or Xx or X2. The interface may be named differently according to different types of the MeNB and the SeNB. For example, the

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interface is denoted as Xx if the MeNB is an LTE eNB and the SeNB is a gNB; or the interface is denoted as Xn if the MeNB is a gNB and the SeNB is an eLTE eNB.

FIG. 2 is a schematic diagram of a protocol architecture in User Equipment (UE) in a dual-connectivity scenario. In the schematic diagram shown in FIG. 2, an RRC entity and a PDCP entity of one split SRB are associated with two RLC entities, two logical channels, and two MAC entities.

Some embodiments of the present disclosure use transmitting a packet or a PDCP PDU twice (that is, one PDCP PDU is transmitted on two RLC entities and/or two logical channels associated therewith) as an example. However, the technical solution in the present disclosure is not limited to the scenario of transmitting a PDCP PDU twice, and those skilled in the art could easily expand the technical solution to scenarios of transmitting a DCP PDU a plurality of times (that is, one PDCP entity is associated with a plurality of RLC entities and/or a plurality of logical channels).

In the embodiments of the present disclosure, an MCG split SRB configured with packet duplication is referred to as an MCG duplicated SRB; an SRB using only resources of a master base station or an MCG, or an SRB of which a wireless protocol is located only in a master base station or an MCG is referred to as an MCG SRB.

In the embodiments of the present disclosure, SRB0 may be configured as MCG SRB0, that is, a wireless protocol of SRB0 is located in an MCG, and radio resources provided by the MCG are used for transmission (including uplink transmission and downlink transmission); SRB1 may be configured as MCG SRB1 or MCG duplicated SRB1; SRB2 may be configured as MCG SRB2 or MCG duplicated SRB2. The downlink transmission of MCG duplicated SRB1 or SRB2 adopts a packet duplication mode, and the uplink transmission is configured via RRC signaling to adopt an MCG or an SCG, or an MCG and an SCG.

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In the embodiments of the present disclosure, an RLC entity and a MAC entity belonging to, or located in, or corresponding to an MCG are denoted as MCG-RLC and MCG-MAC; an RLC entity and a MAC entity belonging to or located in or corresponding to an SCG are denoted as SCG-RLC and SCG-MAC.

FIG. 3 is a flowchart of a method 300 used in user equipment according to an embodiment of the present disclosure. The UE is configured with a Master Cell Group (MCG) duplicated Signaling Radio Bearer (SRB) (e.g., SRB1), and the MCG duplicated SRB is associated with an MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG.

Herein, the UE may receive Radio Resource Control (RRC) signaling (also referred to as an RRC message) from a master base station. The RRC signaling is used to configure or reconfigure MCG duplicated SRB1 for the UE or reconfigure MCG SRB1 as MCG duplicated SRB1. The RRC signaling may be an RRC connection reconfiguration message RRCConnectionReconfiguration.

In an example, the RRC signaling for configuring MCG duplicated SRB1 carries an indicator for indicating an uplink transmission path, or an uplink transmission mode, or an uplink transmission configuration of MCG duplicated SRB1; uplink transmission of MCG duplicated SRB1 may adopt an MCG (i.e., using radio resources provided by the MCG, or a PDCP entity transmits a PDCP PDU to MCG-RLC), an SCG (i.e., using radio resources provided by the SCG, or the PDCP entity transmits a PDCP PDU to SCG-RLC), or the MCG and the SCG (i.e., in a packet duplication mode by using the radio resources provided by the MCG and the SCG, or the PDCP entity transmits the same PDCP PDU to the MCG-RLC and the SCG-RLC). The value of the indicator may be MCG, SCG, both, or duplicate. When the value of the indicator is MCG, it indicates that the uplink transmission of MCG duplicated SRB1 adopts the MCG, that is, the PDCP entity

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transmits data of SRB1 or a PDCP PDU to the MCG-RLC and/or MCG-MAC by using the radio resources of the MCG; when the value of the indicator is SCG, it indicates that the uplink transmission of MCG duplicated SRB1 adopts the SCG, that is, the PDCP entity transmits the data of SRB1 or a PDCP PDU via the SCG-RLC and/or SCG-MAC by using the radio resources of the SCG; when the value of the indicator is both or duplicate, it indicates that the uplink transmission of MCG duplicated SRB1 adopts the MCG and the SCG, that is, the PDCP entity transmits the same data of SRB1 or PDCP PDU via the MCG-RLC and the MCG-MAC and the SCG-RLC and the SCG-MAC by using the radio resources of the MCG and the SCG (in a packet duplication mode). In this embodiment, the value of the indicator may also be other values. Different values are respectively used to indicate that the uplink transmission of MCG duplicated SRB1 adopts one of three modes: MCG, SCG, and MCG and SCG.

In another embodiment, the RRC signaling for configuring MCG duplicated SRB1 carries an indicator. When the value of the indicator is 0 or True or Setup, etc., it indicates that the uplink transmission of MCG duplicated SRB1 adopts the MCG (or the SCG); when the value of the indicator is 1 or False or Release, etc., it indicates that the uplink transmission of MCG duplicated SRB1 adopts the SCG (or the MCG). When the indicator does not appear, it indicates that the uplink transmission of MCG duplicated SRB1 adopts the MCG and the SCG.

In another embodiment, the RRC signaling for configuring MCG duplicated SRB1 carries an indicator. When the value of the indicator is 0 or True or Setup, etc., it indicates that the uplink transmission of MCG duplicated SRB1 adopts the MCG and the SCG (or the SCG); when the value of the indicator is 1 or False or Release, etc., it indicates that the uplink transmission of MCG duplicated SRB1 adopts the SCG (or the MCG and the SCG). When the indicator does not appear, it indicates that the uplink transmission of MCG duplicated SRB1 adopts the MCG.

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As shown in the figure, the method 300 comprises the following steps.

In step S310, an SCG failure is detected.

It should be noted that the SCG failure in the present disclosure may be that an SCG radio link fails, or changing an SCG fails, or a maximum uplink transmission timing difference is exceeded, resulting in termination of uplink transmission of a PSCell when an information element powerControlMode for indicating a power control mode used in a dual-connectivity scenario is set to 1.

The SCG radio link failure in the present disclosure may be triggered by the following events:

Event 1: A timer T313 for monitoring PSCell asynchronization expires.

Event 2: An SCG MAC random access problem (or error) indication is received.

Event 3: For an SCG DRB or a split DRB or an MCG duplicated SRB or an SCG SRB, an indication that a maximum number of retransmissions has been reached is received.

Conditions for the start/stop of timers T307 and T313 and operations performed when the timers expire are shown in Table 1:

Table 1

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Timer	Start	Stop	Expire
T307	An RRC reconfiguration message *RRCConnectionReconfiguration* containing an information element *MobilityControlInfoSCG* instructing to change an SCG is received.	Random access on a PSCell succeeds or re-establishment is initiated or an SCG is released.	An SCG failure information procedure is initiated for notification of an E-UTRAN or 5G-RAN SCG change failure.
T313	A physical layer problem is detected on a PSCell, that is, a continuous out-of-sync indication from a lower layer is received N313 times.	For a PSCell, a continuous in-sync indication from a lower layer is received N314 times or a connection re-establishment procedure is initiated or an SCG is released or *RRCConnectionReconfiguration* containing *MobilityControlInfoSCG* is received.	An SCG failure information procedure is initiated for notification of an E-UTRAN or 5G-RAN SCG radio link failure

In step S320, the MCG duplicated SRB is reconfigured to be used for uplink transmission via the MCG, or an MCG failure is triggered.

In one example, the UE is further configured with another MCG duplicated SRB (e.g., SRB2), and the method 300 further comprises, after the SCG failure is detected: reconfiguring the other MCG duplicated SRB to be used for uplink transmission via the MCG.

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In one example, the reconfiguration may be performed by releasing an uplink transmission configuration of the MCG duplicated SRB or the other MCG duplicated SRB.

In one example, the method 300 further comprises: reporting the SCG failure to a base station. The reporting the SCG failure to a base station comprises: transmitting the SCG failure information to the base station via the MCG by using the reconfigured MCG duplicated SRB, or transmitting the SCG failure information to the base station through a Common Control Channel (CCCH) by using the MCG SRB.

In one example, the method 300 further comprises: receiving from the base station instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails. The reconfiguration is performed only when the instruction information instructs to perform uplink transmission via the MCG when the SCG fails.

Specifically, for the foregoing embodiment for configuring MCG duplicated SRB1, the RRC signaling further comprises an indicator, wherein the indicator is used to indicate whether uplink transmission can be performed by using the MCG when the SCG fails, or if the uplink transmission of MCG duplicated SRB1 is configured to adopt the SCG (or the MCG and the SCG), then whether uplink transmission can be performed by using the MCG when the SCG fails. For example, when the value of the indicator is "1" or "True" or "Setup" or the indicator appears, it indicates that if the uplink transmission of the MCG duplicated SRB is configured to adopt the SCG or the MCG and the SCG, then when the SCG fails, the uplink transmission of the MCG duplicated SRB adopts the MCG. When the value of the indicator is "0" or "False" or "Release" or the indicator does not appear, it indicates that if the uplink transmission of the MCG duplicated SRB is configured to adopt the SCG or the MCG and the SCG, then when the SCG fails, an uplink (UL) Common Control Channel (CCCH) is used to transmit the SCG failure information or an uplink transmission configuration of the MCG duplicated SRB is

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released. When the indicator indicates that the uplink transmission of the MCG duplicated SRB adopts the MCG when the SCG fails, then when the uplink transmission of the MCG duplicated SRB is configured to adopt the SCG or the MCG and the SCG, if an SCG failure occurs, the uplink transmission of the MCG duplicated SRB adopts the MCG.

It should be noted that the reconfiguring the MCG duplicated SRB (or split SRB) to be used for uplink transmission via the MCG may also be expressed as reconfiguring a PDCP entity of the MCG duplicated SRB (or split SRB), such that a PDCP PDU is transmitted via the MCG or MCG-RLC, or reconfiguring the PDCP entity of the MCG duplicated SRB (or split SRB) such that the PDCP entity transmits a PDCP PDU to the MCG-RLC.

The method 300 is described below with reference to specific examples. Herein, without loss of generality, it is assumed that the above MCG duplicated SRB is SRB1, and the other MCG duplicated SRB is SRB2.

When the UE detects an SCG failure, an SCG failure information procedure is initiated to report the SCG failure. The user equipment performs the SCG failure information procedure differently depending on different uplink transmission configurations of MCG duplicated SRB1. Specifically, the following steps are as follows:

1. If uplink transmission of MCG duplicated SRB1 is configured to adopt the MCG, then the SCG failure information procedure comprises at least one of the following operations: A. suspending all SCG DRBs and suspending SCG transmission of split DRBs and split SRBs (or SCG downlink transmission of the split SRBs); B. resetting the SCG-MAC; C. stopping the timer T307 used for monitoring SCG change failures; and D. initiating a transmission procedure of an SCGFailureInformation message. The SCGFailureInformation message is

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used to provide error information detected by the UE, and is transmitted by using the MCG.

2. If the uplink transmission of MCG duplicated SRB1 is configured to adopt the MCG and the SCG, then the SCG failure information procedure comprises at least one of the following operations: A. suspending all SCG DRBs and suspending SCG transmission of split DRBs and split SRBs (or SCG uplink and/or downlink transmission of the split SRBs); B. resetting the SCG-MAC; C. stopping the timer T307 used for monitoring SCG change failures; and D. initiating a transmission procedure of an SCGFailureInformation message. The SCGFailureInformation message is transmitted by using the MCG.
3. If the uplink transmission of MCG duplicated SRB1 is configured to adopt the SCG, the SCG failure information procedure is described in the following exemplary implementations.

Exemplary Implementation 1

The SCG failure information procedure comprises at least one of the following operations: A. suspending all SCG DRBs and suspending SCG transmission of split DRBs and/or SCG transmission of split SRBs (or SCG downlink transmission of the split SRBs or SCG transmission of MCG duplicated SRBs); B. resetting the SCG-MAC; C. stopping the timer T307 used for monitoring SCG change failures; and D. initiating a transmission procedure of an SCGFailureInformation message, wherein the procedure comprises: reconfiguring MCG duplicated SRB1 to be used for uplink transmission via the MCG, and transmitting the SCGFailureInformation message to a lower layer for transmission; or, instructing or reconfiguring a PDCP entity of MCG duplicated SRB1 to transmit the SCGFailureInformation message via the MCG (that is, using resources provided by the MCG for transmission); or, reconfiguring the PDCP entity of MCG

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duplicated SRB1 to release the restriction of transmitting data (or uplink data) of split SRB1 via the SCG; or, releasing an uplink transmission configuration of MCG duplicated SRB1.

Exemplary Implementation 2

The SCG failure information procedure comprises at least one of the following operations: A. suspending all SCG DRBs and suspending SCG transmission of split DRBs and/or SCG transmission of MCG duplicated SRB1 (or SCG downlink transmission of MCG duplicated SRB1); B. resetting the SCG-MAC; C. stopping the timer T307 used for monitoring SCG change failures; D. initiating a transmission procedure of an SCGFailureInformation message, wherein the procedure comprises: reconfiguring MCG duplicated SRB1 to be used for uplink transmission via the MCG, and transmitting the SCGFailureInformation message to a lower layer for transmission; or, instructing or reconfiguring the PDCP entity of MCG duplicated SRB1 to transmit the SCGFailureInformation message via the MCG; or, reconfiguring the PDCP entity of MCG duplicated SRB1 to release the restriction of transmitting the data (or uplink data) of split SRB1 via the SCG; or, releasing the uplink transmission configuration of MCG duplicated SRB1; and E. if uplink transmission of MCG duplicated SRB2 is configured to adopt the SCG, reconfiguring MCG duplicated SRB2 to be used for uplink transmission via the MCG, or instructing or reconfiguring a PDCP entity to release the restriction of performing the uplink transmission of MCG duplicated SRB2 via the SCG, or suspending SCG transmission of MCG duplicated SRB2, or releasing an uplink transmission configuration of MCG duplicated SRB2.

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Exemplary Implementation 3

The SCG failure information procedure comprises at least one of the following operations: A. suspending all SCG DRBs and suspending SCG transmission of split DRBs and/or SCG transmission of split SRBs (or SCG downlink transmission of the split SRBs); B. reconfiguring all MCG duplicated SRBs to be used for uplink transmission via the MCG, or reconfiguring PDCP entities of all the MCG duplicated SRBs to release the restriction of transmitting data (or uplink data) of the split SRBs via the SCG, or releasing uplink transmission configurations of the MCG duplicated SRBs; C. resetting the SCG-MAC; D. stopping the timer T307 used for monitoring SCG change failures; and E. initiating a transmission procedure of an SCGFailureInformation message, wherein the SCGFailureInformation message is transmitted by using the MCG.

Exemplary Implementation 4

The UE detects an SCG failure. If the uplink transmission of MCG duplicated SRB1 is configured to adopt the SCG, it is considered that a failure of a radio link of the MCG is detected, and a related procedure that should be performed when a radio link failure occurs during initiating of the MCG.

Optionally, for the foregoing embodiment for configuring MCG duplicated SRB1, the RRC signaling further comprises an indicator for indicating whether an MCG radio link failure is to be triggered when the SCG fails. When the indicator indicates that an MCG radio link failure is to be triggered when the SCG fails, if the uplink transmission of MCG duplicated SRB1 is configured to adopt the SCG, it is considered that a failure of the radio link of the MCG is detected, and a related procedure that should be performed when a radio link failure occurrence is initiated. For example, when the value of the indicator is "1" or "True" or "Setup" or the indicator appears, an MCG radio link failure is triggered when the SCG fails; when the value of the indicator is "0" or "False"

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or "Release" or the indicator does not appear, an MCG radio link failure is not triggered when the SCG fails; and vice versa.

Optionally, for the foregoing embodiment for configuring MCG duplicated SRB1, if the uplink transmission of MCG duplicated SRB1 is configured to adopt the SCG or the MCG and the SCG, the RRC signaling further comprises an indicator for indicating whether an MCG radio link failure is to be triggered when the SCG fails. When the indicator indicates that an MCG radio link failure is to be triggered when the SCG fails, if the uplink transmission of MCG duplicated SRB1 is configured to adopt the SCG or the MCG and the SCG, it is considered that a failure of the radio link of the MCG is detected, and a related procedure that should be performed when a radio link failure occurrence is initiated.

Exemplary Implementation 5

The SCG failure information procedure comprises at least one of the following operations: A. suspending all SCG DRBs and suspending SCG transmission of split DRBs and/or SCG transmission of split SRBs (or SCG downlink transmission of the split SRBs); B. resetting the SCG-MAC; C. stopping the timer T307 used for monitoring SCG change failures; and D. initiating a transmission procedure of an SCGFailureInformation message, and using an UL-CCCH to transmit the SCGFailureInformation message or using the UL-CCCH (i.e., SRB0) for uplink transmission.

Optionally, for the foregoing embodiment for configuring MCG duplicated SRB1, the RRC signaling further comprises an indicator for indicating whether to use the UL-CCCH to transmit the SCGFailureInformation message or to perform uplink transmission when the SCG fails. Only when the value of the indicator corresponds to using the UL-CCCH to transmit the SCGFailureInformation message when the SCG fails can the UL-CCCH be used to transmit the SCGFailureInformation message when the SCG fails. For

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example, when the value of the indicator is "1" or "True" or "Setup" or the indicator appears, the UL-CCCH is used to transmit the SCGFailureInformation message when the SCG fails. When the value of the indicator is "0" or "False" or "Release" or the indicator does not appear, the UL-CCCH is not used to transmit the SCGFailureInformation message when the SCG fails; or an MCG radio link failure is triggered; and vice versa.

Optionally, for the foregoing embodiment for configuring MCG duplicated SRB1, if the uplink transmission of MCG duplicated SRB1 is configured to adopt the SCG or the MCG and the SCG, the RRC signaling further comprises an indicator for indicating whether to use the UL-CCCH to transmit the SCGFailureInformation message when the SCG fails. Only when the value of the indicator corresponds to using the UL-CCCH to transmit the SCGFailureInformation message when the SCG fails can the UL-CCCH be used to transmit the SCGFailureInformation message when the SCG fails. For example, when the value of the indicator is "1" or "True" or "Setup" or the indicator appears, the UL-CCCH is used to transmit the SCGFailureInformation message when the SCG fails. When the value of the indicator is "0" or "False" or "Release" or the indicator does not appear, the UL-CCCH is not used to transmit the SCGFailureInformation message when the SCG fails; or an MCG radio link failure is triggered; and vice versa.

Exemplary Implementation 6

The SCG failure information procedure comprises at least one of the following operations: A. suspending all SCG DRBs and suspending SCG transmission of split DRBs and/or SCG transmission of split SRBs (or SCG downlink transmission of the split SRBs); B. resetting the SCG-MAC; C. stopping the timer T307 used for monitoring SCG change failures; and D. initiating a transmission procedure of an SCGFailureReport message, wherein the message is used to indicate an SCG failure, or to request the base station to reconfigure MCG duplicated SRBs, or to provide error information detected by

the UE, and using an UL-CCCH to transmit the SCGFailureReport message or using the UL-CCCH (i.e., SRB0) for uplink transmission. Optionally, if an SCGFailureInformation message or the content of the message is not transmitted in the SCGFailureReport message, after receiving a message from the base station for reconfiguring uplink transmission of the MCG duplicated SRBs, the UE initiates a transmission procedure of the SCGFailureInformation message and uses the reconfigured uplink transmission of the MCG duplicated SRBs to transmit the SCGFailureInformation message.

Optionally, for the foregoing embodiment for configuring MCG duplicated SRB1, the RRC signaling further comprises an indicator for indicating whether to use the UL-CCCH to transmit the SCGFailureReport message or to perform uplink transmission when the SCG fails. Only when the value of the indicator corresponds to using the UL-CCCH to transmit the SCGFailureReport message when the SCG fails can the UL-CCCH be used to transmit the SCGFailureReport message when the SCG fails; otherwise, the UL-CCCH is not used to transmit the SCGFailureReport message when the SCG fails, or an MCG radio link failure is triggered. For example, when the value of the indicator is "1" or "True" or "Setup" or the indicator appears, the UL-CCCH is used to transmit the SCGFailureReport message when the SCG fails. When the value of the indicator is "0" or "False" or "Release" or the indicator does not appear, the UL-CCCH is not used to transmit the SCGFailureReport message when the SCG fails; or an MCG radio link failure is triggered; and vice versa.

Optionally, for the foregoing embodiment for configuring MCG duplicated SRB1, if the uplink transmission of MCG duplicated SRB1 is configured to adopt the SCG or the MCG and the SCG, the RRC signaling further comprises an indicator for indicating whether to use the UL-CCCH to transmit the SCGFailureReport message when the SCG fails. Only when the value of the indicator corresponds to using the UL-CCCH to transmit the SCGFailureReport message when the SCG fails can the UL-CCCH be used

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to transmit the SCGFailureReport message when the SCG fails; otherwise, the UL-CCCH is not used to transmit the SCGFailureReport message when the SCG fails, or an MCG radio link failure is triggered. For example, when the value of the indicator is "1" or "True" or "Setup" or the indicator appears, the UL-CCCH is used to transmit the SCGFailureReport message when the SCG fails. When the value of the indicator is "0" or "False" or "Release" or the indicator does not appear, the UL-CCCH is not used to transmit the SCGFailureReport message when the SCG fails; or an MCG radio link failure is triggered; and vice versa.

It should be noted that the embodiments for configuring MCG duplicated SRB1 described in the present disclosure are also applicable to configuring MCG duplicated SRB2 by simply replacing SRB1 in each example with SRB2.

It should be noted that, if MCG duplicated SRB2 is configured to adopt the SCG in uplink, when the SCG fails, then the operations in the above SCG failure information procedure embodiments may further comprise reconfiguring MCG duplicated SRB2 to be used for uplink transmission via the MCG.

Corresponding to the method 300 described above, the present disclosure provides User Equipment (UE). FIG. 4 is a block diagram of UE 400 according to an embodiment of the present disclosure. The UE 400 is configured with a Master Cell Group (MCG) duplicated Signaling Radio Bearer (SRB), and the MCG duplicated SRB is associated with an MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG. As shown in the figure, the UE 400 comprises a transceiver 410, a processor 420, and a memory 430. The processor 430 stores instructions executable by the processor 420 to cause the base station 400 to perform the method 300 described above with reference to FIG. 3.

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Specifically, the processor 430 stores instructions executable by the processor 420 to cause the UE 400 to perform the following: detect an SCG failure and reconfigure the MCG duplicated SRB to be used for uplink transmission via the MCG, or trigger an MCG failure.

In one example, the UE is further configured with another MCG duplicated SRB. The processor 430 further stores instructions executable by the processor 420 to cause the UE 400 to, after the SCG failure is detected, reconfigure the other MCG duplicated SRB to be used for uplink transmission via the MCG.

In one example, the processor 430 further stores instructions executable by the processor 420 to cause the UE 400 to report the SCG failure to a base station, wherein the reporting the SCG failure to a base station comprises: transmitting the SCG failure information to the base station via the MCG by using the reconfigured MCG duplicated SRB, or transmitting the SCG failure information to the base station through a Common Control Channel (CCCH) by using the MCG SRB.

In one example, the processor 430 further stores instructions executable by the processor 420 to cause the UE 400 to receive from the base station instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails, wherein the reconfiguration is performed only when the instruction information instructs to perform uplink transmission via the MCG when the SCG fails.

The present disclosure further provides a method used in a base station. FIG. 5 is a flowchart of a method 500 used in a base station according to an embodiment of the present disclosure. The base station is a Master Cell Group (MCG) base station and communicates with User Equipment (UE) over an MCG duplicated Signaling Radio Bearer (SRB); the MCG duplicated SRB is associated with the MCG and a Secondary

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Cell Group (SCG) and configured to be used for uplink transmission via the SCG. As shown in the figure, the method 500 comprises the following steps:

In step S510, a report on an SCG failure is received from the UE.

In step S520, the MCG duplicated SRB is reconfigured to receive uplink transmission via the MCG.

In one example, the receiving a report on an SCG failure comprises: receiving the SCG failure information via the MCG by using the reconfigured MCG duplicated SRB, or receiving the SCG failure information through a Common Control Channel (CCCH) by using the MCG SRB.

In one example, the base station further communicates with the UE over another MCG duplicated SRB, the method 500 further comprising: reconfiguring the other MCG duplicated SRB to receive uplink transmission via the MCG.

In an example, the method 500 further comprises: transmitting to the UE instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails.

The various examples described above regarding the method 300, Exemplary Implementations 1-6 in particular, are also applicable to the method 500.

In accordance with the method 500 described above, the present disclosure provides a base station. FIG. 6 is a block diagram of a base station 600 according to an embodiment of the present disclosure. The base station is a Master Cell Group (MCG) base station and communicates with User Equipment (UE) over an MCG duplicated Signaling Radio Bearer (SRB); the MCG duplicated SRB is associated with the MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG. As shown in the figure, the base station 600 comprises a transceiver 610, a processor 620, and a memory 630. The processor 630 stores instructions executable by

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the processor 620 to cause the base station 600 to perform the method 500 described above with reference to FIG. 5.

Specifically, the processor 630 stores instructions executable by the processor 620 to cause the base station 600 to receive from the UE a report on an SCG failure and reconfigure the MCG duplicated SRB to receive uplink transmission via the MCG.

In one example, the receiving a report on an SCG failure comprises: receiving the SCG failure information via the MCG by using the reconfigured MCG duplicated SRB, or receiving the SCG failure information through a Common Control Channel (CCCH) by using the MCG SRB.

In one example, the base station also communicates with the UE over another MCG duplicated SRB, and the processor 630 further stores instructions executable by the processor 620 to cause the base station 600 to reconfigure the other MCG duplicated SRB to receive uplink transmission via the MCG.

In one example, the processor 630 stores instructions executable by the processor 620 to cause the base station 600 to transmit to the UE instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails.

The computer-executable instructions or program running on the device according to the present invention may be a program that enables the computer to implement the functions of the embodiments of the present invention by controlling the central processing unit (CPU). The program or information processed by the program can be stored temporarily in a volatile memory (for example, a random access memory (RAM)), a hard disk drive (HDD), a non-volatile memory (for example, a flash memory), or other memory systems.

The computer-executable instructions or program for implementing the functions of the embodiments of the present invention may be recorded on a computer-readable

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storage medium. The corresponding functions can be achieved by reading programs recorded on the recording medium and executing them by the computer system. The so-called "computer system" herein may be a computer system embedded in the device, which may include operating systems or hardware (for example, peripherals). The "computer-readable storage medium" may be a semiconductor recording medium, an optical recording medium, a magnetic recording medium, a short-time dynamic memory program recording medium, or any other recording medium readable by a computer.

Various features or functional modules of the device used in the above embodiments may be implemented or executed through circuits (for example, monolithic or multi-chip integrated circuits). Circuits designed to execute the functions described in this description may include general-purpose processors, digital signal processors (DSPs), application specific integrated circuits (ASICs), field programmable gate arrays (FPGAs) or other programmable logic devices, discrete gates or transistor logic, or discrete hardware components, or any combination of the above. The general-purpose processor may be a microprocessor, or may be any existing processor, a controller, a microcontroller, or a state machine. The circuit may be a digital circuit or an analog circuit. When new integrated circuit technologies replacing existing integrated circuits emerge from advances in semiconductor technology, one or a plurality of embodiments of the present invention may also be implemented using these new integrated circuit technologies.

Furthermore, the present invention is not limited to the embodiments described above. Although various examples of the embodiments have been described, the present invention is not limited thereto. Fixed or non-mobile electronic devices installed indoors or outdoors, such as AV equipment, kitchen equipment, cleaning equipment, air conditioner, office equipment, vending machines, and other household appliances, may be used as terminal devices or communications devices.

The embodiments of the present invention have been described in detail above with reference to the accompanying drawings. However, the specific structures are not limited to the above embodiments. The present invention also includes any design modifications that do not depart from the main idea of the present invention. In addition, various modifications can be made to the present invention within the scope of the claims. Embodiments resulted from the appropriate combinations of the technical means disclosed in different embodiments are also included within the technical scope of the present invention. In addition, components with the same effect described in the above embodiments may be replaced with one another.

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CLAIMS

[Claim 1]

A method used in User Equipment (UE), the UE being configured with a Master Cell Group (MCG) duplicated Signaling Radio Bearer (SRB), the MCG duplicated SRB being associated with an MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, and the method comprising:

detecting an SCG failure; and

reconfiguring the MCG duplicated SRB to be used for uplink transmission via the MCG, or triggering an MCG failure.

[Claim 2]

The method according to claim 1, wherein the UE is further configured with another MCG duplicated SRB, and the method further comprises, after the SCG failure is detected:

reconfiguring the other MCG duplicated SRB to be used for uplink transmission via the MCG.

[Claim 3]

The method according to claim 1, further comprising:

reporting the SCG failure to a base station, wherein

the reporting the SCG failure to a base station comprises:

transmitting the SCG failure information to the base station via the MCG by using the reconfigured MCG duplicated SRB, or

transmitting the SCG failure information to the base station through a Common Control Channel (CCCH) by using the MCG SRB.

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[Claim 4]

The method according to claim 1, further comprising:

receiving from the base station instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails, wherein

the reconfiguration is performed only when the instruction information instructs to perform uplink transmission via the MCG when the SCG fails.

[Claim 5]

User Equipment (UE), comprising a transceiver, a processor, and a memory, the processor storing instructions executable by the processor to cause the UE to perform the method according to any one of claims 1 to 4.

[Claim 6]

A method used in a base station, the base station being a Master Cell Group (MCG) base station and communicating with User Equipment (UE) over an MCG duplicated Signaling Radio Bearer (SRB), the MCG duplicated SRB being associated with the MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, and the method comprising:

receiving from the UE a report on an SCG failure; and

reconfiguring the MCG duplicated SRB to receive uplink transmission via the MCG.

[Claim 7]

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The method according to claim 6, wherein the receiving a report on an SCG failure comprises:

receiving the SCG failure information via the MCG by using the reconfigured MCG duplicated SRB, or

receiving the SCG failure information through a Common Control Channel (CCCH) by using the MCG SRB.

[Claim 8]

The method according to claim 6, wherein the base station further communicates with the UE over another MCG duplicated SRB, and the method further comprises:

reconfiguring the other MCG duplicated SRB to receive uplink transmission via the MCG.

[Claim 9]

The method according to claim 6, further comprising: transmitting to the UE instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails.

[Claim 10]

A base station, comprising a transceiver, a processor, and a memory, the processor storing instructions executable by the processor to cause the base station to perform the method according to any one of claims 6 to 9.

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Abstract

The present disclosure provides a method used in User Equipment (UE). The UE is configured with a Master Cell Group (MCG) duplicated Signaling Radio Bearer (SRB). The MCG duplicated SRB is associated with an MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG. The method comprises: detecting an SCG failure; and reconfiguring the MCG duplicated SRB to be used for uplink transmission via the MCG, or triggering an MCG failure.

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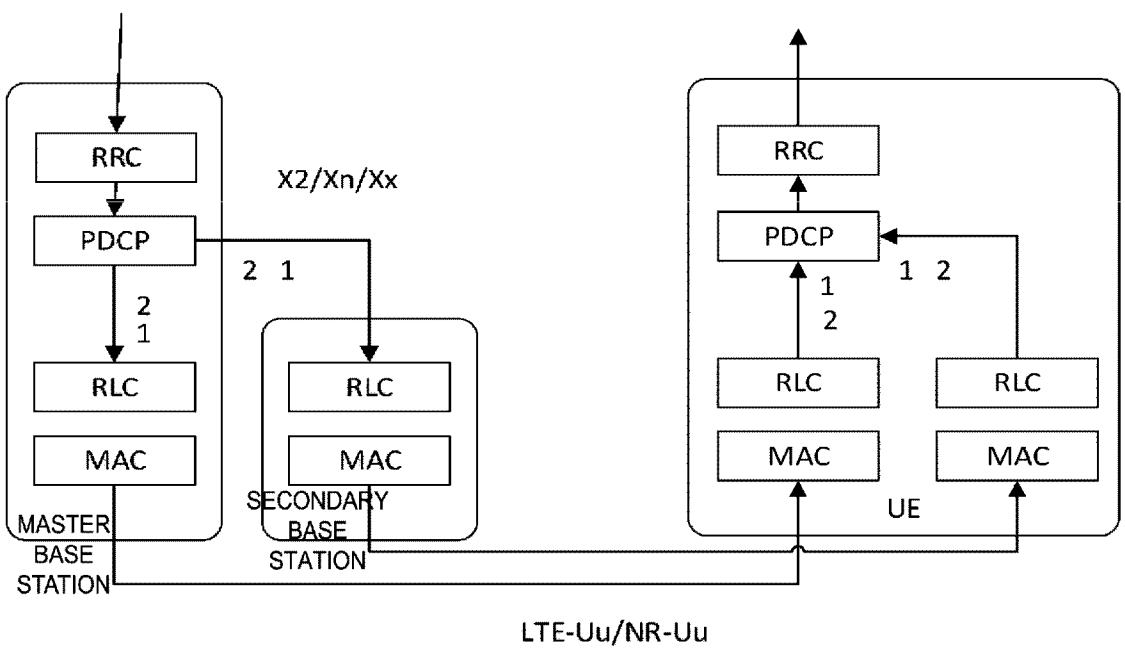

RRC
PDCP
2
1
RLC
MAC
MASTER BASE STATION
X2/Xn/Xx
2 1
RLC
MAC
SECONDARY BASE STATION
RRC
PDCP
1 2
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2
RLC
RLC
MAC
MAC
UE
LTE-Uu/NR-Uu

FIG. 1

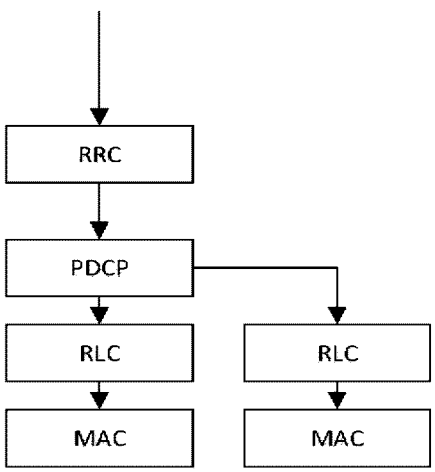


FIG. 2

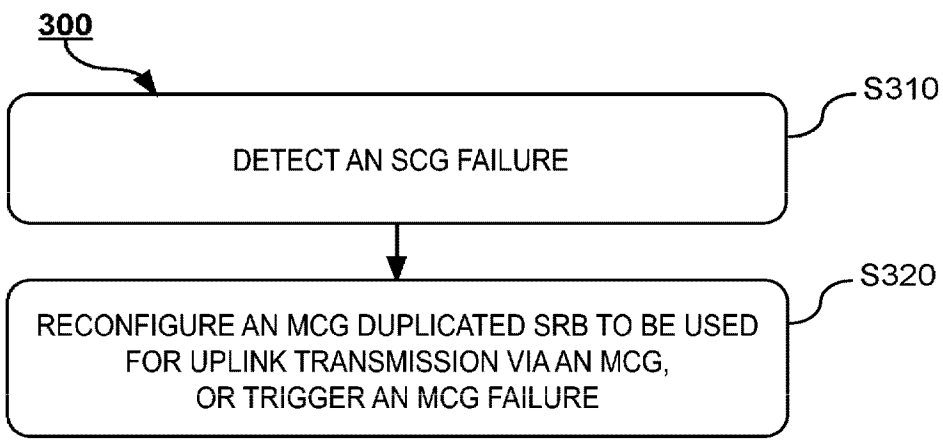

300
S310
DETECT AN SCG FAILURE
S320
RECONFIGURE AN MCG DUPLICATED SRB TO BE USED FOR UPLINK TRANSMISSION VIA AN MCG, OR TRIGGER AN MCG FAILURE

FIG. 3

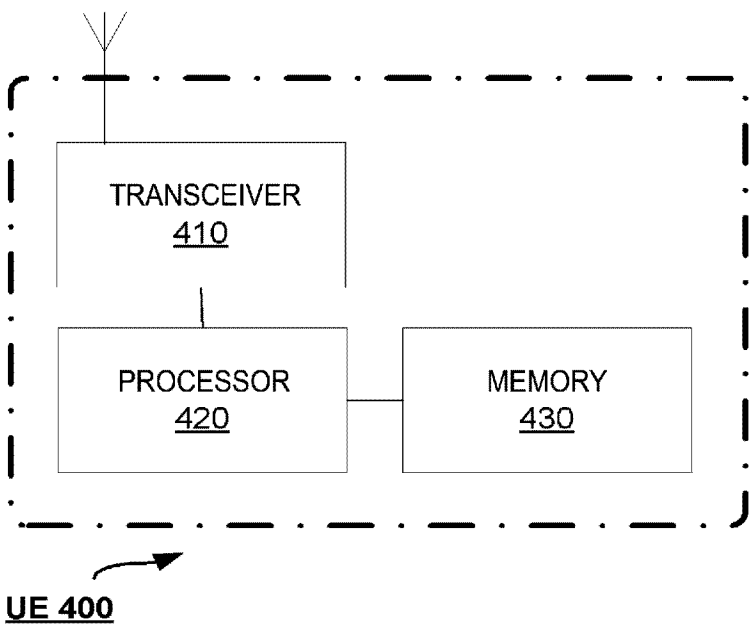


FIG. 4

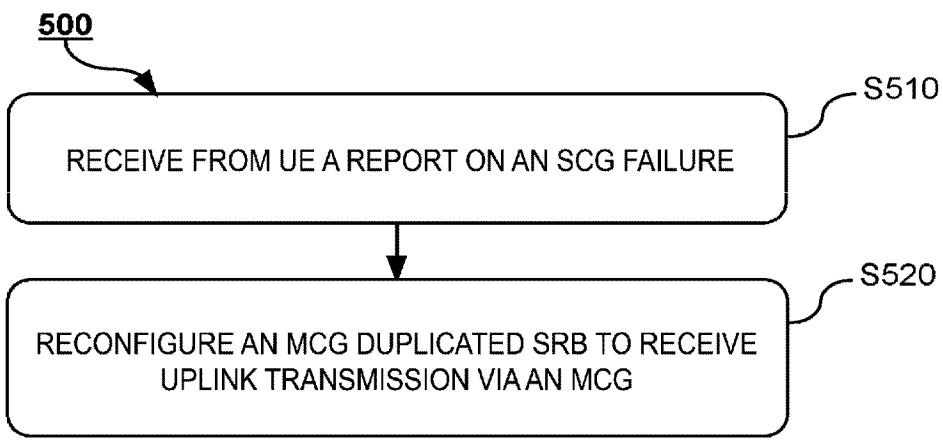

500
S510
RECEIVE FROM UE A REPORT ON AN SCG FAILURE
S520
RECONFIGURE AN MCG DUPLICATED SRB TO RECEIVE UPLINK TRANSMISSION VIA AN MCG

FIG. 5

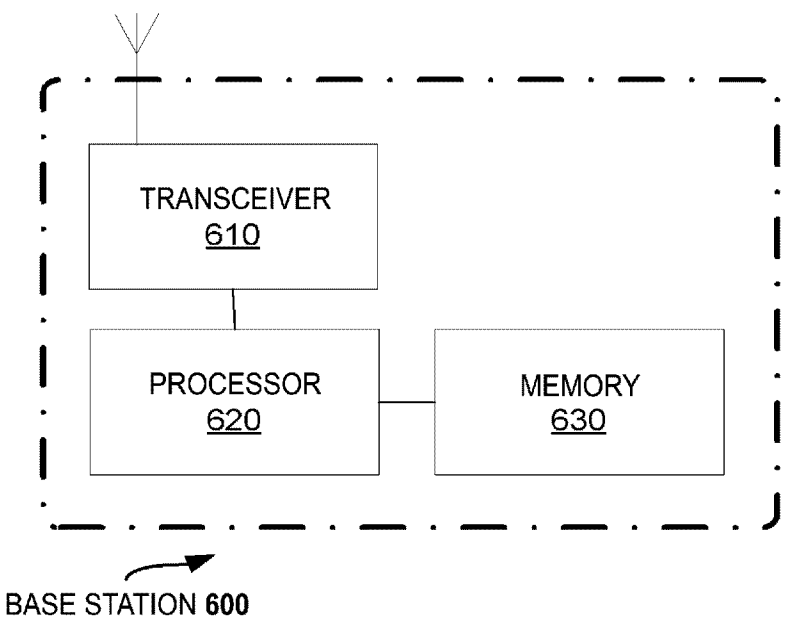


FIG. 6

Attorney Docket No.:

COMBINED PATENT ASSIGNMENT AND DECLARATION (37 CFR 1.63)

特許出願宣言付き譲渡書(37 CFR 1.63)

私は下記に記載の発明者/譲渡人として:

As a below named INVENTOR/ASSIGNOR of the patent application entitled:

USER EQUIPMENT, BASE STATION, AND RELATED METHODS

And which is:

本宣言付き譲渡書は以下に関します。

☐ 添付の出願、または

☑ _____年____月_____日に出願された米国出願あるいは PCT 国際出願番号 _____

☐ The attached application, or

☑ United States Application or PCT International Application Number PCT/CN2018/099379 filed on August 08, 2018.

上記に明示された出願は私が作成した、または作成を許可したものである事をここに宣言します。

私は、私が本出願内で請求されている発明の最初の発明者、または最初の共同発明者であると信じます。

私は本宣言付き譲渡書の提出に関わる出願の内容を検討し、理解しています。

私は 37 CFR 1.56 に定義される特許性に肝要な私の知るすべての情報について当局に開示する義務があることを認識しています。

本書以降で譲渡人と呼ばれる上記に署名した発明者は、上記で特定される本出願に記載する特定の発明をしているため、また、

1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan の Sharp Kabushiki Kaisha（譲受人）は本出願および本発明に対する全ての権利、権原、および利益、ならびに当該出願および発明に対して得られる米国内、およびすべての外国で交付される特許証の取得を希望しているため、

I declare that:

The above identified application was made or was authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the application for which this assignment with declaration is being submitted.

I am aware of the duty to disclose to the Office all information known to me to be material to patentability as defined in 37 CFR 1.56.

Whereas, the undersigned inventor(s) hereinafter called ASSIGNOR(S), have invented certain inventions described in the application identified above; and

Whereas, Sharp Kabushiki Kaisha of 1, Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan, (ASSIGNEE(S)), desires to acquire the entire right, title, and interest in the application and invention, and any Letters Patent that may be granted therefore in the United States and in any and all foreign countries;

DAINGEAN_0004268

譲受人から譲渡人への１ドル($1.00)の支払いおよびその他の有価約因に基づき、その受領をここに確認したうえで

譲渡人は、譲受人、その後継者および継承人に対して、すべての分割出願および継続出願を含めて、アメリカ合衆国の本出願およびそこに開示された発明に対する全ての権利、権原および利益（その後の改正を含む協定の下、又はその他の関係する国際条約および国際協定の下でのすべての権利を含む）、ならびに同出願および発明に対して交付された米国特許証およびその全ての再発行を売却、譲渡および移転します。

譲渡人は、本譲渡書および販売に抵触する譲渡、販売、契約および債務の成立および締結が行われないことを契約します。

譲渡人は、譲受人から依頼があった場合、譲渡人が知り縦覧できる、当該出願、発明、および特許証にかかわる適切な事実および資料を譲受人に提供し、譲受人が必要とみなすすべての資料に追加の対価を得ることなく署名し、これに関連するいかなる干渉および訴訟において証言することに同意します。

私は本宣言付き譲渡書において故意になされた一切の虚偽の陳述が 18 USC 1001 に基づき罰金あるいは 5 年以下の拘禁または両方による処罰にあたることに同意します。

本宣言付き譲渡書は、対応する英文の譲渡書及び宣言書の正確な翻訳文です。

In consideration of the payment by ASSIGNEE(S) to ASSIGNOR(S) of the sum of One Dollar ($1.00) and for other valuable consideration, receipt thereof is hereby acknowledged,

ASSIGNOR(S) sell, assign, and transfer to ASSIGNEE(S), its successors and assigns, the entire right, title, and interest in the application and the invention disclosed therein for the United States of America, including all divisions, and continuations thereof, and all Letters Patent of the United States that may be granted thereon, and all reissues thereof, including all rights under the Paris Convention as amended, or other relevant International Treaties and Arrangements.

ASSIGNOR(S) covenant(s) that no assignment, sale, agreement, or encumbrance has been or will be made or entered into which would conflict with this assignment and sale.

ASSIGNOR(S) agree(s), when called upon to do so by the ASSIGNEE(S), to provide ASSIGNEE(S) with all pertinent facts and documents relating to the application, the invention, and the Letters Patent as may be known and accessible to ASSIGNOR(S); to sign without further consideration all papers deemed necessary by the ASSIGNEE(S); and to testify as to the same in any interference or litigation related thereto.

I acknowledge that any willful false statement made in this combined declaration/assignment is punishable under 18 USC 1001 by fine or imprisonment of not more than five (5) years, or both.

The combined declaration/assignment is an accurate translation of the corresponding English language assignment and declaration.

LEGAL NAME OF FIRST INVENTOR/ASSIGNOR
第１の発明者/譲渡人の正式氏名
Inventor:
発明者: XIAO, Fangying
Date:
日付: 2019-11-13
Signature:
署名: XIAO, Fangying

LEGAL NAME OF SECOND INVENTOR/ASSIGNOR
第２の発明者/譲渡人の正式氏名
Inventor:
発明者: LIU, Renmao
Date:
日付: 2019.11.13
Signature:
署名: Liu Renmao

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	FANGYING		XIAO	

Residence Information (Select One) US Residency ● Non US Residency Active US Military Service

City	Shanghai	Country of Residence i	CN

Mailing Address of Inventor:

Address 1	c/o SHARP UNIVERSAL TECHNOLOGY(SHANGHAI)CO.,LTD.
Address 2	No. 1111, Jinhai Rd., Pudong
City	Shanghai
State/Province	
Postal Code	201206
Country i	CN

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	RENMAO		LIU	

Residence Information (Select One) US Residency ◉ Non US Residency Active US Military Service

City	Shanghai	Country of Residence i	CN

Mailing Address of Inventor:

Address 1	c/o SHARP UNIVERSAL TECHNOLOGY(SHANGHAI)CO.,LTD.
Address 2	No. 1111, Jinhai Rd., Pudong
City	Shanghai
State/Province	
Postal Code	201206
Country i	CN

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	145688		
Email Address	eoa-proce@scienbizip.com	Add Email	Remove Email
Email Address	eoa-cbd@scienbizip.com	Add Email	Remove Email
Email Address	eoa-procc@scienbizippc.com		Remove Email

Application Information:

Title of the Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS		
Attorney Docket Number	US80118	**Small Entity Status Claimed** ☐	
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	145688		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	a 371 of international	PCT/CN2018/099379	2018-08-08

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
201710683129.0	CN	2017-08-10	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	SHARP KABUSHIKI KAISHA		
Mailing Address Information For Applicant:			
Address 1	1, Takumi-cho, Sakai-ku		
Address 2			
City	Sakai City, Osaka	**State/Province**	
Country	JP	Postal Code	590-8522
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Kyoko C. Makino/			Date (YYYY-MM-DD)	2020-02-07
First Name	Kyoko	Last Name	Makino	Registration Number	72200

Additional Signature may be generated within this form by selecting the Add button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
Approved for use through 01/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: SHARP KABUSHIKI KAISHA

Application No./Patent No.: Herewith Filed/Issue Date: Herewith

Titled: USER EQUIPMENT, BASE STATION, AND RELATED METHODS

SHARP KABUSHIKI KAISHA, a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☑ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

   1. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

   2. From: _____ To: _____

      The document was recorded in the United States Patent and Trademark Office at

      Reel _____, Frame _____, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Kyoko C. Makino/	2020-02-07
Signature	Date
Kyoko C. Makino	72200
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO-1390 (01-18)
Approved for use through 8/31/2019. OMB 0651-0021
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A SUBMISSION UNDER 35 U.S.C. 371

Attorney Docket No.	
US80118	
U.S. Application No. (if known, see 37 CFR 1.5)	

International Application No.	International Filing Date	Priority Date Claimed
PCT/CN2018/099379	2018-08-08	2017-08-10

Title of Invention
USER EQUIPMENT, BASE STATION, AND RELATED METHODS

First Named Inventor
XIAO, FANGYING

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). NOTE: The express request under 35 U.S.C. 371(f) will not be effective unless the requirements under 35 U.S.C. 371(c)(1), (2), and (4) for payment of the basic national fee, copy of the International Application and English translation thereof (if required), and the oath or declaration of the inventor(s) have been received.
2. ☐ A copy of the International Application (35 U.S.C. 371(c)(2)) is attached hereto (not required if the International Application was previously communicated by the International Bureau or was filed in the United States Receiving Office (RO/US)).
3. An English language translation of the International Application (35 U.S.C. 371(c)(2))
   a. ☒ is attached hereto.
   b. ☐ has been previously submitted under 35 U.S.C. 154(d)(4).
4. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4))
   a. ☒ is attached.
   b. ☐ was previously filed in the international phase under PCT Rule 4.17(iv).

Items 5 to 8 below concern amendments made in the international phase.

PCT Article 19 and 34 amendments

5. ☐ Amendments to the claims under PCT Article 19 are attached (not required if communicated by the International Bureau) (35 U.S.C. 371(c)(3)).
6. ☐ English translation of the PCT Article 19 amendment is attached (35 U.S.C. 371(c)(3)).
7. ☐ English translation of annexes (Article 19 and/or 34 amendments only) of the International Preliminary Examination Report is attached (35 U.S.C. 371(c)(5)).

Cancellation of amendments made in the international phase

8a. ☐ Do not enter the amendment made in the international phase under PCT Article 19.

8b. ☐ Do not enter the amendment made in the international phase under PCT Article 34.

NOTE: A proper amendment made in English under Article 19 or 34 will be entered in the U.S. national phase application absent a clear instruction from applicant not to enter the amendment(s).

The following items 9 to 17 concern a document(s) or information included.

9. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
10. ☒ A preliminary amendment.
11. ☒ An Application Data Sheet under 37 CFR 1.76.
12. ☐ A substitute specification. NOTE: A substitute specification cannot include claims. See 37 CFR 1.125(b).
13. ☒ A power of attorney and/or change of address letter.
14. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13*ter*.3 and 37 CFR 1.821-1.825 (not required if sequence listing in text format was indicated on the PCT Request as part of the International Application and the sequence listing was published as part of the international application).
15. ☒ Assignment papers *(cover sheet and document(s))*. Name of Assignee: Sharp Kabushiki Kaisha
16. ☒ 37 CFR 3.73(c) Statement *(when there is an Assignee)*.

This collection of information is required by 37 CFR 1.414 and 1.491-1.492. The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 15 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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U.S. APPLN. No. (if known – see 37 CFR 1.5)	INTERNATIONAL APPLICATION No.	ATTORNEY DOCKET No.
	PCT/CN2018/099379	US80118

17. ☐ Other items or information:

The following fees have been submitted.	CALCULATIONS
18. ■ Basic national fee (37 CFR 1.492(a)) **$300**	$ 300
19. ■ Examination fee (37 CFR 1.492(c)) • If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0** • All other situations **$760**	$ 760
20. ■ Search fee (37 CFR 1.492(b)) • If the written opinion prepared by ISA/US or the international preliminary examination report prepared by IPEA/US indicates all claims satisfy provisions of PCT Article 33(1)-(4)..... **$0** • Search fee (37 CFR 1.445(a)(2)) has been paid on the international application to the USPTO as an International Searching Authority ..... **$140** • International Search Report prepared by an ISA other than the US and provided to the Office or previously communicated to the US by the IB..... **$520** • All other situations **$660**	520 $
TOTAL OF 18, 19, and 20 =	$ 1580

☐ Additional fee for specification and drawings filed in paper over 100 sheets (excluding sequence listing in compliance with 37 CFR 1.821(c) or (e) in an electronic medium or computer program listing in an electronic medium) (37 CFR 1.492(j)).

Fee for each additional 50 sheets of paper or fraction thereof **$400**

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof (round **up** to a whole number)	RATE
- 100 =	/ 50 =		x **$400**

$

Surcharge for furnishing any of the search fee, examination fee, or the oath or declaration after the date of commencement of the national stage (37 CFR 1.492(h))..... **$140**	$

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	- 20 =		x **$100**	$
Independent claims	- 3 =		x **$460**	$
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			**+ $820**	$

Fee for submission of Sequence Listing text file of 300 MB to 800 MB (37 CFR 1.21(o)(1))..... **$1,000**	$
Fee for submission of Sequence Listing text file of more than 800 MB (37 CFR 1.21(o)(2))..... **$10,000**	$
Processing fee for furnishing the English translation later than 30 months from the earliest claimed priority date (37 CFR 1.492(i))..... **$140 +**	$
TOTAL OF ABOVE CALCULATIONS =	$ 1580
☐ **Applicant asserts small entity status.** See 37 CFR 1.27. Fees above are reduced by ½.	
☐ **Applicant certifies micro entity status.** See 37 CFR 1.29. Fees above are reduced by ¾. Applicant must attach form PTO/SB/15A or B or equivalent.	
TOTAL NATIONAL FEE =	$ 1580
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31)..... **$50.00** per property **+**	$
TOTAL FEES ENCLOSED =	$ 1580

DAINGEAN_0004282

a. ☐ A check in the amount of $_____ to cover the above fees is enclosed.

b. ☒ Please charge my Deposit Account No. 505142 in the amount of $_____ to cover the above fees.

c. ☒ The Director is hereby authorized to charge additional fees which may be required, or credit any overpayment, to Deposit Account No. 505142 as follows:

i. ☒ any required fee.

ii. ☐ any required fee except for excess claims fees required under 37 CFR 1.492(d) and (e) and multiple dependent claim fee required under 37 CFR 1.492(f).

d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038. The PTO-2038 should only be mailed or faxed to the USPTO. However, when paying the basic national fee, the PTO-2038 may NOT be faxed to the USPTO.

ADVISORY: If filing by EFS-Web, do **NOT** attach the PTO-2038 form as a PDF along with your EFS-Web submission. Please be advised that this is **not** recommended and by doing so your **credit card information may be displayed via PAIR**. To protect your information, it is recommended to pay fees online by using the electronic payment method.

NOTE: Where an appropriate time limit under 37 CFR 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the International Application to pending status.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013, and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE 1: By providing this statement under 37 CFR 1.55 or 1.78, **this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA**.

NOTE 2: A U.S. national stage application may not claim priority to the international application of which it is the national phase. The filing date of a U.S. national stage application is the international filing date. See 35 U.S.C. 363.

Correspondence Address

☒ The address associated with Customer Number: 145688 **OR** ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone			
Email					

Signature	/Kyoko C. Makino/	Date	2020-02-07
Name (Print/Type)	Kyoko C. Makino	Registration No. (Attorney/Agent)	72200

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
First Named Inventor/Applicant Name:	FANGYING XIAO
Filer:	Kyoko C. Makino
Attorney Docket Number:	US80118

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
NATIONAL STAGE FEE	1631	1	300	300
NATL STAGE SEARCH FEE - REPORT PROVIDED	1642	1	520	520
NATIONAL STAGE EXAM - ALL OTHER CASES	1633	1	760	760
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1580**

Electronic Acknowledgement Receipt

EFS ID:	38531729
Application Number:	16637693
International Application Number:	PCT/CN2018/099379
Confirmation Number:	2923
Title of Invention:	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
First Named Inventor/Applicant Name:	FANGYING XIAO
Customer Number:	145688
Filer:	Kyoko C. Makino
Filer Authorized By:	
Attorney Docket Number:	US80118
Receipt Date:	07-FEB-2020
Filing Date:	
Time Stamp:	18:53:24
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$1580
RAM confirmation Number	E202027I54318068
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

DAINGEAN_0004287

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Non Patent Literature	US80118200202IDS-NPL.pdf	1172166 3b0ea4f69a0410a3aaa5fb3d248cd65d55112f4b	no	8
Warnings:					
Information:					
2	Non Patent Literature	US80118200201IDS-NPL.pdf	80168 0f2237fdfeb060e6a0a1606dc6ea5054bd2b05ec	no	5
Warnings:					
Information:					
3	Preliminary Amendment	US80118200207FPA.pdf	31917 4261118a02eecf0d039e37d7b5a6dbc99962f6b3	no	6
Warnings:					
Information:					
4	Power of Attorney	US80118200207POA.pdf	373305 a2f8d650e6acad7f533b760d5376cbebe59f7a0b	no	2
Warnings:					
Information:					
5	Information Disclosure Statement (IDS) Form (SB08)	US80118__IDS.pdf	1034864 7d72327f2f487849cd5aba1687402ba40f46865a	no	4
Warnings:					
Information:					

A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.

6	Specification	US80118200207_Spec.pdf	84331 872729a962107c998646016c873425e61d37cdc7	no	29
Warnings:					
Information:					
7	Claims	US80118200207_Clms.pdf	24378 f2a52d6dfe903a75257227065cf554cf2660ee2c	no	3
Warnings:					
Information:					
8	Abstract	US80118200207_Abst.pdf	20891 df721f7bbc4d6ebb42c5235075defca556d89e71	no	1
Warnings:					
Information:					
9	Drawings-only black and white line drawings	US80118200207_draw.pdf	52207 00256ef0360a63bbfed8753bed8d71d340a83818	no	6
Warnings:					
Information:					
10	Oath or Declaration filed	US80118200207DEC.pdf	646811 484bec30e90abffbf9df63042a571467de9996c5	no	2
Warnings:					
Information:					
11	Application Data Sheet	US80118__ADS.pdf	1792773 335588e1b462890482726566a065c842888c2d7b	no	8
Warnings:					
Information:					
12	Assignee showing of ownership per 37 CFR 3.73	US80118__ASO.pdf	134696 351307cc16ae5fae7d80b04a5ed02b3a63c7fc5b	no	3
Warnings:					
Information:					

13	Documents submitted with 371 Applications	US80118__DSA.pdf	295525 860959800f002c85eb38762ebcc62eedaf1d173b	no	4
Warnings:					
Information:					
14	Fee Worksheet (SB06)	fee-info.pdf	35100 6d18f5ab6025191dc0ab2de97414405842f3ca04	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	5779132		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

3GPP TSG RAN Meeting #71 **RP-160671**
Göteborg, Sweden, 7.-10. March, 2016

Source:	**NTT DOCOMO**
Title:	**New SID Proposal: Study on New Radio Access Technology**
Document for:	**Discussion**
Agenda Item:	**9.1**

3GPP™ Work Item Description

For guidance, see 3GPP Working Procedures, article 39; and 3GPP TR 21.900.
Comprehensive instructions can be found at http://www.3gpp.org/Work-Items

Title: Study on NR New Radio Access Technology

Acronym: FS_ NR_newRAT

Unique identifier:

NOTE: If this is a RAN WID including Core and Perf. part, then Title, Acronym and Unique identifier refer to the feature WI. Please tick (X) the applicable box(es) in the table below:

This WID includes a Core part	
This WID includes a Performance part	

1 3GPP Work Area

X	**Radio Access**
	Core Network
	Services

2 Classification of WI and linked work items

2.0 Primary classification

This work item is a …

X	**Study Item (go to 2.1)**
	Feature (go to 2.2)
	Building Block (go to 2.3)
	Work Task (go to 2.4)

NOTE: Core, Performance and Testing parts of RAN WIs are usually Building Blocks.
If you are in doubt, please contact MCC.

2.1 Study Item

Related Work Item(s) (if any)		
Unique ID	**Title**	**Nature of relationship**
FS_NG_Req	Study on Scenarios and Requirements for the New Radio Access Technology	
FS_CM_Above6GHz	Study on channel model for frequency spectrum above 6 GHz	

Go to §3.

2.2 Feature

Related Study Item or Feature (if any)		
Unique ID	Title	Nature of relationship

Go to §3.

2.3 Building Block

Parent Feature (or Study Item)		
Unique ID	Title	TS

This work item is …

	Stage 1 (go to 2.3.1)
	Stage 2 (go to 2.3.2)
	Stage 3 (go to 2.3.3)
	Test spec (go to 2.3.4)
	Other (go to 2.3.5)

2.3.1 Stage 1

Source of external requirements (if any)		
Organization	Document	Remarks

Go to §3.

2.3.2 Stage 2

Corresponding stage 1 work item		
Unique ID	Title	TS

Other source of stage 1 information		
TS or CR(s)	Clause	Remarks

If no identified source of stage 1 information, justify:

Go to §3.

2.3.3 Stage 3

Corresponding stage 2 work item (if any)		
Unique ID	Title	TS

Else, corresponding stage 1 work item		
Unique ID	Title	TS

Other justification		
TS or CR(s) or external document	Clause	Remarks

If no identified source of stage 2 information, justify:

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Go to §3.

2.3.4 Test spec

Related Work Item(s)		
Unique ID	Title	TS

Go to §3.

2.3.5 Other

Related Work Item(s)			
Unique ID	Title	Nature of relationship	TS / TR

Go to §3.

2.4 Work task

Parent Building Block		
Unique ID	Title	TS

3 Justification

Work has started in ITU and 3GPP to develop requirements and specifications for new radio (NR) systems, as in the Recommendation ITU-R M.2083 "Framework and overall objectives of the future development of IMT for 2020 and beyond", as well as 3GPP SA1 study item New Services and Markets Technology Enablers (SMARTER) and SA2 study item Architecture for NR System. In addition, a joint RAN-SA document [SP-150149] from RAN#67 outlines the "NR" timeline for 3GPP, further detailed in the September RAN workshop on NR [RWS-150073].

3GPP has to identify and develop the technology components needed for successfully standardizing the NR system timely satisfying both the urgent market needs, and the more long-term requirements set forth by the ITU-R IMT-2020 process. Further, the NR system should be able to use any spectrum band ranging at least up to 100 GHz that may be made available for wireless communications even in a more distant future.

The [SP-150149] foresaw the following timeline

1) September 2015: RAN workshop
2) September 2015: Initiation of the channel modelling work needed for the NR
3) December 2015: Initiation of the RAN Study Item: scope & requirements for the NR
4) March 2016: Initiation of the RAN WG SI: Identification and evaluation of solutions

RAN#68 saw the first draft study item proposals for discussion for points 2) [RP-150781] and 3) [RP-150813], and further RAN#69 saw the first draft study item proposals for 4) in [RP-151278] and [RP-151551]. A study item on 2) [RP-151606] started in RAN#69.

This study item will address point 4) and build on the work done in the three preceding steps, discussions in the RAN workshop on NR, and the draft SIDs submitted to RAN#69.

4 Objective

4.1 Objective of SI or Core part WI or Testing part WI

The study aims to develop an NR access technology to meet a broad range of use cases including enhanced mobile broadband, massive MTC, critical MTC, and additional requirements defined during the RAN requirements study.

The new RAT will consider frequency ranges up to 100 GHz [TR38.913].

Detailed objectives of the study item are:

(1) Target a single technical framework addressing all usage scenarios, requirements and deployment scenarios defined in TR38.913 including
   - Enhanced mobile broadband
   - Massive machine-type-communications
   - Ultra reliable and low latency communications

(2) The new RAT shall be inherently forward compatible
   - It is assumed that the normative specification would occur in two phases: Phase I (to be completed in June 2018) and Phase II (to be completed in December 2019)
   - Phase I specification of the new RAT must be forward compatible (in terms of efficient co-cell/site/carrier operation) with Phase II specification and beyond, and backward compatibility to LTE is not required
   - Phase II specification of the new RAT builds on the foundation of Phase I specification, and meets all the set requirements for the new RAT.
   - Smooth future evolution beyond Phase II needs to be ensured to support later advanced features and to enable support of service requirements identified later than Phase II specification.

(3) Initial work of the study item should allocate high priority on gaining a common understanding on what is required in terms of radio protocol structure and architecture to fulfil objective 1 and 2, with focus on progressing in the following areas
   - Fundamental physical layer signal structure for new RAT
     - Waveform based on OFDM, with potential support of non-orthogonal waveform and multiple access
       - FFS: other waveforms if they demonstrate justifiable gain
     - Basic frame structure(s)
     - Channel coding scheme(s)
   - Radio interface protocol architecture and procedures
   - Radio Access Network architecture, interface protocols and procedures,
     Study on the above 2 bullets shall at least cover:
     - Study the feasibility of different options of splitting the architecture into a "central unit" and a "distributed unit", with potential interface in between, including transport, configuration and other required functional interactions between these nodes [RAN2, RAN3];
       - Study the alternative solutions with regard to signaling, orchestration, …, and OAM, where applicable [in co-operation with SA5];
     - Study and outline the RAN-CN interface and functional split [in co-operation with SA2] [RAN2, RAN3];
     - Study and identify the basic structure and operation of realization of RAN Networks functions (NFs). Study to what extent it is feasible to standardize RAN NFs, the interfaces of RAN NFs and their interdependency [RAN3];
     - Study and identify specification impacts of enabling the realization of Network Slicing [in co-operation with SA2] [RAN2, RAN3];
     - Study and identify additional architecture requirements e.g. support for QoS concept, SON, support of sidelink for D2D [RAN1, RAN2, RAN3].
   - Fundamental RF aspects – especially where they may impact decisions on the above, e.g.,
     - Study and identify the aspects related to the testability of RF and performance requirements

(4) Study and identify the technical features necessary to enable the new radio access to meet objective 1 and 2, also including:
   - Tight interworking between the new RAT and LTE
   - Interworking with non-3GPP systems
   - Operation in licensed bands (paired and unpaired), and licensed assisted operations in unlicensed bands
     - [Standalone operation in unlicensed bands is FFS]

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- Efficient multiplexing of traffic for different services and use cases on the same contiguous block of spectrum
- Stand alone operation in licensed bands

Note 1: The scope of Phase I will be determined when agreeing on Phase I WID(s).

Note 2: Stated KPI values and deployment scenarios to be aligned to scenarios and requirement SI outcome

(5) Provide performance evaluation of the technologies identified for the new RAT and analysis of the expected specification work

(6) Identify relevant RF parameters used to be used for sharing and co-existence studies

(7) Study and identify technical solutions that enable support for wireless relay

4.2 Objective of Performance part WI

NOTE: Leave empty if the WI proposal does not contain a RAN performance part.

4.3 RAN time budget proposal

NOTE: For WIs/SIs under RAN WG5 leadership this section is not filled out. Otherwise:
For a not yet approved WI/SI the rapporteur has to fill out the last row of the table(s) below up to the target date of the WI/SI (if necessary add further tables): Indicate the number of time units (1 TU ~ 2h), i.e. one value for each session/field. If no time unit is needed, leave the field empty.
For WI/SI already approved in the past, the tables below will no longer be updated in the WI/SI description (i.e. the tables reflect the status of the initial approval). But changes can be proposed in the status report of the WI/SI.

RAN #71			Q2/2016				RAN #72
R1N	R2N	R3N	R4N	R1N	R2N	R3N	R4N
84bis	93bis	91bis	78bis	85	94	92	79
12	6	6	1.5	20	6	6	2

RAN #72		Q3/2016		RAN#73
R1N	R2N	R3N	R4N	
96	95	93	80	
[20]	[8]	[4]	[8]	

RAN #73			Q4/2016				RAN#74
R1N	R2N	R3N	R4N	R1N	R2N	R3N	R4N
96bis	95bis	93bis	80bis	97	96	94	81
[24]	[8]	[4]	[8]	[24]	[8]	[4]	[8]

RAN #74		Q1/2017	RAN#75
R1N	R2N	R3N	R4N
98	97	95	82
[24]	[8]	[4]	[12]

RAN #75			Q2/2017				RAN#76
R1N	R2N	R3N	R4N	R1N	R2N	R3N	R4N
98bis	97bis	95bis	82bis	99	98	96	83
			[12]				[12]

L: LTE, U: UMTS, J: Joint, RD: RRM/demodulation

NOTE: In case further explanation of the time budget proposal is needed, then please explain this below.

additional comments to the time budget proposal:

Completion date is proposed to be June 2018. Exact TU allocation for each involved WG is TBD.

This study is assumed to be handled in separate parallel sessions in RAN1 and in parallel and joint sessions in RAN2. It is assumed that 2-3 days of meeting time are needed initially in both RAN1 and RAN2, increasing to 3-4 days of meeting time during the study. For RAN3 and RAN4 the work in study item phase can probably be handled in existing sessions. Note also that additional meetings and possibly additional ad hoc meetings with limited agenda may be scheduled as needed in any working group.

5 Service Aspects

6 MMI-Aspects

7 Charging Aspects

8 Security Aspects

9 Impacts

Affects:	UICC apps	ME	AN	CN	Others
Yes		x	x		
No					
Don't know	x			x	x

10 Expected Output and Time scale

New specifications						
Spec No	Title	1st rsp. WG	2nd rsp. WG(s)	Presented for information at plenary#	Approved at plenary #	Comments
38.9xx	TR for Study on New Radio Access Technology	RANP	RAN1, RAN2, RAN3, RAN4	RAN#75	RAN#76 (June 2017)	
38.8xx	TR for Study on New Radio Access Technology Physical Layer Aspects	RAN1		RAN#75	RAN#76 (June 2017)	RAN1 internal
38.8xx	TR for Study on New Radio Access Technology Radio Interface Protocol Aspects	RAN2		RAN#75	RAN#76 (June 2017)	RAN2 internal
38.8xx	TR for Study on New Radio Access Technology: Radio Access Architecture and Interface	RAN3		RAN#75	RAN#76 (June 2017)	RAN3 internal
38.8xx	TR for Study on New Radio Access Technology: RF and co-existence aspects	RAN4		RAN#75	RAN#76 (June 2017)	RAN4 internal

NOTE: If this is a RAN WID including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Comments for each spec. By default a new specs can only be new for one of both parts.

Affected existing specifications [None in the case of Study Items]				
Spec No	CR	Subject of the CR	Approved at plenary#	Comments

NOTE: If this is a RAN WID including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Comments for each spec. If an existing spec is affected by both (Core part and Perf. part), then it has to be listed twice with appropriate approval dates.

11 Work item rapporteur(s)

<FamilyName>, <GivenName>
Kazuaki Takeda
Company: NTT DOCOMO, INC.
Email: kazuaki.takeda.hs@nttdocomo.com

12 Work item leadership

RAN1 (primary), RAN2/3/4 (secondary)

NOTE: If this is a RAN WID including Core and Perf. part, then this WG specifies the WG leading the Core part. RAN WG4 is by default leading the Perf. part.

13 Supporting Individual Members

Supporting IM name
NTT DOCOMO
Alcatel-Lucent
Alcatel-lucent Shanghai Bell
AT&T
CATT
CMCC
Ericsson
Fujitsu
HiSilicon
Huawei
III
Intel
InterDigital
ITRI
KDDI
KT
Lenovo
LG Electronics
MediaTek
Mitsubishi Electric
Motorola Mobility
NEC
Nokia Networks
OPPO
Orange
Panasonic
Qualcomm
Samsung
Sharp
Sierra Wireless
SK Telecom
Softbank
Sony
SPREADTRUM
T-Mobile USA
Telecom Italia
Verizon
Vodafone
Xilinx
ZTE

3GPP TSG-RAN WG2 NR Adhoc #2 **R2-1706857**
Qingdao, China, 27 - 29 June 2017

Agenda item: 10.2.5

Source: Nokia, Alcatel-Lucent Shanghai Bell

Title: Further considerations for SCG SRB and RLF handling

WID/SID: NR_newRAT (Release 15)

Document for: Discussion and Decision

1 Introduction

In the RAN2#98 meeting, the following agreements were made during the discussion on SCG SRB and SCG RLF.

> Agreements for EN-DC and NGEN-DC:
> 1: SCG SRB is modelled as one of the NR SRBs defined in 38.331.
> 2: SCG SRB uses NR-DCCH logical channel type.
> 3: A UE can be configured with both split MCG SRB and SCG SRB simultaneously.
> 4: SCG SRB and the SCG leg of split SRB1/2 will be independently configured
> 5: SCG-SRB establishment and release can be done at SCG addition and SN change
> 6 SCG-SRB reconfiguration can be done at SCG modification procedure.
> 7 RRC PDUs on SCG-SRB are ciphered using NR PDCP.
> 8 RRC PDUs on SCG-SRB are integrity protected using NR PDCP.
> 9 Security keys for SCG-SRB are derived from S-KgNB.

In the RAN2#97-bis meeting, the following agreements were made during the discussion on SCG SRB and SCG RLF.

> Agreements:
> 1 SCG SRB can be configured based on network decision.
> 2 Addition of SCG SRB is decided by SN.
> **FFS** Whether the MN can request establishment of SCG SRB
> 3 SCG SRB configuration is provided by NR RRC from SN.
> 4 NR RRC complete messages and measurement reports are mapped to the same SRB as the message initiating the procedure.
> **FFS** Whether there are any exceptional cases for the complete messages
> **FFS** Whether explicit configuration is also supported for measurement reports.
> 5 All LTE RRC messages are mapped to MCG SRB.
> 6 EN-DC can only be configured after security activation on LTE.

In addition, the following agreements were made related to the number, terminology for the SN SRB and SN failure handling cases:

> Agreement
> 1 In NSA (for option 3, option 4, 7), MN RRC is used for MN connection control such as connection establishment and release, MN handovers for the UE.
> 2 In NSA (for option 3, option 4, 7), RRC parameters to configure NR PHY, NR MAC, NR RLC and NR PDPC are captured in the NR RRC specification.
> **FFS** whether the SCG configuration from the SN will be an RRCConnectionReconfiguration or a new message (e.g. named "SCGConfigurationCommand"). Can be considered when we have a better idea of the content of the messages.
> **FFS** How to capture procedures for bearer configurations so that those are not split among different specifications

Agreement
1 For LTE-NR tight interworking where LTE is the MN with SCG SRB configured, only one SRB is required on the SN side, and only for messages corresponding to SRB1.
FFS is anything additional is needed for SN failure cases.

Agreements
1: SCG SRB is of higher scheduling priority than all DRBs.
2: UE processes messages received on SCG SRB one message at a time in the order received at the RRC. (i.e. same rules as in LTE).
3: There is no requirement on the UE to perform any reordering of RRC messages between MCG SRB and SCG SRB.
FFS: What terminology will be used to describe the SCG SRB.

Agreements:
1: In LTE-NR DC, following SgNB failure cases need to be supported:
- SgNB RLF;
- SgNB change failure;
- exceeding the maximum uplink transmission timing difference (if EN-DC supports the synchronised operation case which is RAN1 decision);
- SgNB configuration failure (only for message on SCG SRB);
- SgNB RRC integrity check failure;

2: In LTE-NR DC, the UE shall report the SCGFailureInformation to the MeNB instead of triggering the reestablishment upon SgNB failure.
3: Upon SgNB failures, UE shall:
- Suspend all SCG DRBs and suspend SCG transmission for MCG split DRBs, and SCG split DRBs;
- Suspend direct SCG SRB and SCG transmission for MCG split SRB;
- Reset SCG-MAC;
- send the SCGFailureInformation message to the MeNB with corresponding cause values .

Agreement:
Working assumption (SCG integrity protection failure case is to be confirmed after SA3 response): At SCG failure (all cases) only the SCG part of MCG/SCG split bearers should be suspended. (Already agreed for the SCG bearer and the SCG SRB)

In this discussion paper, we will discuss our views on how to solve the FFS aspects.

2 Discussion

FFS Whether the MN can request establishment of SCG SRB

To discuss the FFS aspect above, the following scenario for SCG SRB addition is shown below.

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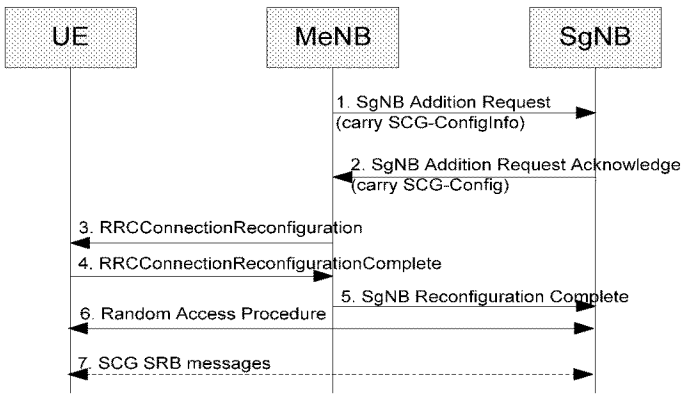


Figure 2-1: SCG SRB establishment during SgNB addition

Figure 2-1 describes the establishment of SCG SRB. It is assumed in this scenario that the SCG SRB may be established by the SN by knowing the EN-DC UE capability, hence the SN would explicitly send the configuration during SgNB addition.

3. Capability dependency between LTE and NR.
   - **Type I capabilities**: The use of the capability is isolated to the RAT.
   - Type II capabilities: The use of the capability in one RAT has impacts to the other RAT but is not understood by the NW side of the other RAT.
   - Type III capabilities: The use of the capability in one RAT has impacts to the other RAT and is understood by the NW side of the other RAT.

Since Type I capabilities do not need any negotiation between MN and SN, the responsibility of decision to configure SCG SRB is always at the SN as agreed during last meeting.

Proposal 1: SCG SRB is always configured by default during the initial SgNB addition.

It is rather safe to assume that if the SN cannot allocate the SCG SRB configuration, then SgNB addition procedure must be considered a failure.

Proposal 2: SgNB addition procedure is considered failed if SN cannot allocate SCG SRB.

The SN must be allowed to update the configuration of the SCG SRB and then the reconfiguration could be performed using the SCG SRB.

Proposal 3: SCG SRB may be reconfigured by the SN using the RRCConnectionReconfiguration transmitted on the SCG SRB.

We now progress to the topic of discussing the formatting of the NR RRC PDU in the LTE/NR DC operation.

FFS whether the SCG configuration from the SN will be an RRCConnectionReconfiguration or a new message (e.g. named "SCGConfigurationCommand"). Can be considered when we have a better idea of the content of the messages.
FFS How to capture procedures for bearer configurations so that those are not split among different specifications

There are mainly 4 cases; MN message containing LTE only configuration, MN message containing LTE + NR configuration, MN message containing NR only configuration and SN message containing SCG only configuration. If we take a set of combinations of these cases, there are several cases where:

- SN message containing SCG only configuration may be delivered to the UE before the MN message containing LTE + NR configuration is delivered

- SN message containing SCG only configuration may be delivered to the UE before MN message containing NR only configuration is delivered

The UE is not responsible for tracking the order of the messages and neither reordering them. But the UE will need to distinguish one transaction from the other and the network will need to know the transaction identifier for failure handling. Hence, we propose:

Proposal 4: The SN RRC PDU contains a transaction identifier.

Agreement
1 For LTE-NR tight interworking where LTE is the MN with SCG SRB configured, only one SRB is required on the SN side, and only for messages corresponding to SRB1.
FFS is anything additional is needed for SN failure cases.

As far as the SCG SRB unreliability is concerned, because it has the highest coding, any problem with its operation should be enough to lead to SCG RLF i.e. the CP failure must mean that the UP cannot be maintained as well. Hence, we propose:

Proposal 5: If SCG SRB is unreliable the SCG RLF condition is considered met.

At SCG RLF, the UE should be able to continue using the MCG path if it is available, i.e. MN leg should be used in both directions.

Proposal 6: The UE may continue using the MN leg in DL and UL upon SCG failure (resulting from SCG SRB being unreliable).

After SCG RLF, the UE should be able to indicate any newly found NR cells in its uplink report to the MN. The MN should forward the report to the SN.

Proposal 7: After SCG RLF is declared an UE may report newly found NR cells in the SCGFailureInformation message.

Proposal 8: The SCGFailureInformation message is forwarded to the SN by the MN.

Proposal 9: Based on the analysis of measurement results the SgNB initiates the SCG re-establishment procedure towards the MN.

3 Conclusion

In this contribution, several miscellaneous topics have been dealt with on the aspects of SCG SRB initial addition and SCG RLF handling.

Proposal 1: SCG SRB is always configured by default during the initial SgNB addition.

Proposal 2: SgNB addition procedure is considered failed if SN cannot allocate SCG SRB.

Proposal 3: SCG SRB may be reconfigured by the SN using the RRCConnectionReconfiguration transmitted on the SCG SRB.

Proposal 4: The SN RRC PDU contains a transaction identifier.

Proposal 5: If SCG SRB is unreliable the SCG RLF condition is considered met.

Proposal 6: The UE may continue using the MN leg in DL and UL upon SCG failure (resulting from SCG SRB being unreliable).

Proposal 7: After SCG RLF is declared an UE may report newly found NR cells in the SCGFailureInformation message.

Proposal 8: The SCGFailureInformation message is forwarded to the SN by the MN.

Proposal 9: Based on the analysis of measurement results the SgNB initiates the SCG re-establishment procedure towards the MN.

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References

[1] R2-1704346 *Further considerations for SCG SRB and RLF handling*, Nokia, Alcatel-Lucent Shanghai Bell

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	TBD
Application Filing Date	:	TBD
Examiner	:	TBD
Art Unit	:	TBD
Confirmation No.	:	TBD
Attorney Docket No.	:	US80118
First Inventor	:	XIAO, Fangying
Customer No.	:	145688

PRELIMINARY AMENDMENT

A Listing of Claims begins on page **2** of this paper. This listing of claims will replace all prior versions, and listings, of claims in the application.

Remarks begin on page **5** of this paper.

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DAINGEAN_0004304

Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

[Claim 1] (Original)

A method used in User Equipment (UE), the UE being configured with a Master Cell Group (MCG) duplicated Signaling Radio Bearer (SRB), the MCG duplicated SRB being associated with an MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, and the method comprising:

detecting an SCG failure; and

reconfiguring the MCG duplicated SRB to be used for uplink transmission via the MCG, or triggering an MCG failure.

[Claim 2] (Original)

The method according to claim 1, wherein the UE is further configured with another MCG duplicated SRB, and the method further comprises, after the SCG failure is detected:

reconfiguring the other MCG duplicated SRB to be used for uplink transmission via the MCG.

[Claim 3] (Original)

The method according to claim 1, further comprising:

reporting the SCG failure to a base station, wherein

the reporting the SCG failure to a base station comprises:

transmitting the SCG failure information to the base station via the MCG by using the reconfigured MCG duplicated SRB, or

transmitting the SCG failure information to the base station through a Common Control Channel (CCCH) by using the MCG SRB.

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[Claim 4] (Original)

The method according to claim 1, further comprising:

receiving from the base station instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails, wherein

the reconfiguration is performed only when the instruction information instructs to perform uplink transmission via the MCG when the SCG fails.

[Claim 5] (Currently Amended)

User Equipment (UE), comprising a transceiver, a processor, and a memory, the processor storing instructions executable by the processor to cause the UE to perform the method according to claim 1~~any one of claims 1 to 4~~.

[Claim 6] (Original)

A method used in a base station, the base station being a Master Cell Group (MCG) base station and communicating with User Equipment (UE) over an MCG duplicated Signaling Radio Bearer (SRB), the MCG duplicated SRB being associated with the MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, and the method comprising:

receiving from the UE a report on an SCG failure; and

reconfiguring the MCG duplicated SRB to receive uplink transmission via the MCG.

[Claim 7] (Original)

The method according to claim 6, wherein the receiving a report on an SCG failure comprises:

receiving the SCG failure information via the MCG by using the reconfigured MCG duplicated SRB, or

receiving the SCG failure information through a Common Control Channel (CCCH) by using

the MCG SRB.

[Claim 8] (Original)

The method according to claim 6, wherein the base station further communicates with the UE over another MCG duplicated SRB, and the method further comprises:

reconfiguring the other MCG duplicated SRB to receive uplink transmission via the MCG.

[Claim 9] (Original)

The method according to claim 6, further comprising: transmitting to the UE instruction information instructing the UE whether to perform uplink transmission via the MCG when the SCG fails.

[Claim 10] (Currently Amended)

A base station, comprising a transceiver, a processor, and a memory, the processor storing instructions executable by the processor to cause the base station to perform the method according to claim 6~~any one of claims 6 to 9~~.

DAINGEAN_0004307

REMARKS

The title is amended from " USER EQUIPMENT, BASE STATION, AND RELATED METHOD", as published at an international stage in the PCT, to --USER EQUIPMENT, BASE STATION, AND RELATED METHODS-- for Applicant considers the latter one to be more suitable to the original Chinese title at an international stage and provides as such in the Invention Title of the concurrently filed English Specification and Application Data Sheet.

Claims 5 and 10 are amended herein to remove multiple dependencies.

No new matter is added by this Preliminary Amendment.

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CONCLUSION

If the Examiner believes that there are any issues that can be resolved by a telephone conference, or that there are any informalities that can be corrected by an Examiner's amendment, please call the undersigned representative at the number given below.

The undersigned representative requests any extension of time that may be deemed necessary to further the prosecution of this application.

The undersigned representative authorizes the Commissioner to charge any additional fees under 37 C.F.R. 1.16 or 1.17 that may be required, or credit any overpayment, to Deposit Account No. 505142, referencing Attorney Docket No.: US80118.

Respectfully submitted,

By / Kyoko Makino /

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AT&T, et al. Ex. 1002 p. 151 of 393

DAINGEAN_0004309

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 16/637,693

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	520
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	760
TOTAL CLAIMS (37 CFR 1.16(i))	10 minus 20 =	*			OR	x 100 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*				x 460 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1580

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

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U.S. APPLICATION NO.	FIRST NAMED INVENTOR	ATTY. DOCKET NO.
16/637,693	FANGYING XIAO	US80118

145688
SBPJ/ScienBiziP, P.C.
550 South Hope Street
Suite 2825
Los Angeles, CA 90071

INTERNATIONAL APPLICATION NO.	
PCT/CN2018/099379	
I.A. FILING DATE	PRIORITY DATE
08/08/2018	08/10/2017

CONFIRMATION NO. 2923
371 ACCEPTANCE LETTER

OC000000114748504

Date Mailed: 02/19/2020

NOTICE OF ACCEPTANCE OF APPLICATION UNDER 35 U.S.C 371 AND 37 CFR 1.495

The applicant is hereby advised that the United States Patent and Trademark Office, in its capacity as a Designated / Elected Office (37 CFR 1.495), has ACCEPTED the above identified international application for national patentability examination in the United States Patent and Trademark Office.

The United States Application Number assigned to the application is shown above. A Filing Receipt will be issued for the present application in due course. **THE DATE APPEARING ON THE FILING RECEIPT AS THE "FILING DATE or 371(c) DATE" IS THE DATE ON WHICH THE LAST OF THE 35 U.S.C. 371 (c)(1) and (c)(2) REQUIREMENTS HAS BEEN RECEIVED IN THE OFFICE. THIS DATE IS SHOWN BELOW.** The filing date of the above identified application is the international filing date of the international application (Article 11(3) and 35 U.S.C. 363)

02/07/2020
DATE OF RECEIPT OF 35 U.S.C.
371(c)(1) and (c)(2) REQUIREMENTS

The following items have been received:

- Copy of the International Application filed on 02/07/2020
- Copy of the International Search Report filed on 02/07/2020
- Preliminary Amendments filed on 02/07/2020
- Information Disclosure Statements filed on 02/07/2020
- Inventor's Oath or Declaration filed on 02/07/2020
- Request for Immediate Examination filed on 02/07/2020
- U.S. Basic National Fees filed on 02/07/2020
- Authorize Access to Search Results filed on 02/07/2020
- Priority Documents filed on 02/07/2020
- Power of Attorney filed on 02/07/2020
- Authorization to Permit Access filed on 02/07/2020
- Application Data Sheet (37 CFR 1.76) filed on 02/07/2020

FORM PCT/DO/EO/903 (371 Acceptance Notice)

Applicant is reminded that any communications to the United States Patent and Trademark Office must be mailed to the address given in the heading and include the U.S. application no. shown above (37 CFR 1.5)

PATRICIA A BOOKER

Telephone: (571) 272-3882

FORM PCT/DO/EO/903 (371 Acceptance Notice)

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/637,693	02/07/2020		1580	US80118	10	1

CONFIRMATION NO. 2923

FILING RECEIPT

145688
SBPJ/ScienBiziP, P.C.
550 South Hope Street
Suite 2825
Los Angeles, CA 90071

OC000000114748503

Date Mailed: 02/19/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

FANGYING XIAO, Shanghai, CHINA;
RENMAO LIU, Shanghai, CHINA;

Applicant(s)

SHARP KABUSHIKI KAISHA, Sakai City, Osaka, JAPAN;

Power of Attorney: The patent practitioners associated with Customer Number 145688

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/CN2018/099379 08/08/2018

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
CHINA 201710683129.0 08/10/2017

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 02/14/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/637,693**

Projected Publication Date: 05/28/2020

Non-Publication Request: No

Early Publication Request: No
Title

USER EQUIPMENT, BASE STATION, AND RELATED METHODS

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

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Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

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Title 37, Code of Federal Regulations, 5.11 & 5.15

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MULTIPLE DEPENDENT CLAIM FEE CALCULATION SHEET

Substitute for Form PTO-1360
(For use with Form PTO/SB/06)

Application Number	Filing Date
16637693	

Applicant(s) FANGYING XIAO

* May be used for additional claims or amendments

CLAIMS	AS FILED		AFTER FIRST AMENDMENT		AFTER SECOND AMENDMENT			*		*		*	
	Indep	Depend	Indep	Depend	Indep	Depend		Indep	Depend	Indep	Depend	Indep	Depend
1			1				51						
2				1			52						
3				1			53						
4				1			54						
5				1			55						
6				1			56						
7				1			57						
8				1			58						
9				1			59						
10				1			60						
11							61						
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39							89						
40							90						
41							91						
42							92						
43							93						
44							94						
45							95						
46							96						
47							97						
48							98						
49							99						
50							100						
Total Indep	0		1		0								
Total Depend	0	↵	9	↵	0	↵							
Total Claims	0		10		0								

To: eoa-proce@scienbizip.com,eoa-cbd@scienbizip.com,eoa-procc@scienbizippc.com
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 145688

Feb 19, 2020 04:02:51 AM

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550 South Hope Street
Suite 2825
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UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
16637693	M903	02/19/2020	US80118
	APP.FILE.REC	02/19/2020	US80118

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/637,693	02/07/2020	FANGYING XIAO	US80118

CONFIRMATION NO. 2923

145688
SBPJ/ScienBiziP, P.C.
550 South Hope Street
Suite 2825
Los Angeles, CA 90071

PUBLICATION NOTICE

OC000000117306540

Title:USER EQUIPMENT, BASE STATION, AND RELATED METHODS

Publication No.US-2020-0169899-A1
Publication Date:05/28/2020

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

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In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently https://portal.uspto.gov/pair/PublicPair. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

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DAINGEAN_0004318

To: eoa-proce@scienbizip.com,eoa-cbd@scienbizip.com,eoa-procc@scienbizippc.com
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
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May 29, 2020 03:56:43 AM

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Application	Document	Mailroom Date	Attorney Docket No.
16637693	NTC.PUB	05/28/2020	US80118

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Document Description: Power of Attorney

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Application Number	16/637693
Filing Date	02-07-2020
First Named Inventor	FANGYING XIAO
Title	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
Art Unit	2464
Examiner Name	NGO, RICKY QUOC
Attorney Docket Number	US80118

SIGNATURE of Applicant or Patent Practitioner

Signature	/Calvin H Chai/	Date (Optional)	2020-07-28
Name	Calvin H Chai	Registration Number	68,009
Title (if Applicant is a juristic entity)	Patent Practitioner		
Applicant Name (if Applicant is a juristic entity)	SHARP KABUSHIKI KAISHA, FG INNOVATION COMPANY LIMITED		

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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(National Phase of PCT/JP2017/003319 filed on January 31, 2017)

DAINGEAN_0004320

Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82B (07-13)
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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

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OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

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OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

SHARP KABUSHIKI KAISHA

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	/Mototaka Taneya/	Date (Optional)	
Name	Mototaka Taneya		
Title	MANAGING OFFICER BU PRESIDENT CORPORATE RESEARCH & DEVELOPMENT OF SHARP KABUSHIKI KAISHA		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Document Description: Power of Attorney

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 145688

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

Please recognize or change the correspondence address for the application identified in the attached transmittal letter or the boxes above to:

☑ The address associated with the above-mentioned Customer Number

OR

☐ The address associated with Customer Number:

OR

Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

FG INNOVATION COMPANY LIMITED

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	Chie-Ming Chou	Date (Optional)	2017.2.1
Name	CHIE-MING CHOU		
Title	CEO of FG INNOVATION COMPANY LIMITED		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☐ Total of forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

(National Phase of PCT/JP2017/003319 filed on January 31, 2017)

DAINGEAN_0004322

Doc Code: R46C.REQ
Document Description: Request under 37 CFR 1.46(c) to correct, update or change the applicant.

PTO/AIA/41 (04-15)
Approved for use through 11/30/2020. OMB 0651-0031
U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
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REQUEST TO CORRECT OR UPDATE THE NAME OF THE APPLICANT UNDER 37 CFR 1.46(c)(1), OR CHANGE THE APPLICANT UNDER 37 CFR 1.46(c)(2)

(FOR USE ONLY IN APPLICATIONS FILED ON OR AFTER SEPTEMBER 16, 2012)

Application Number	16/637693
Filing Date	02-07-2020
First Named Inventor	FANGYING XIAO
Art Unit	2464
Examiner Name	NGO, RICKY QUOC
Practitioner Docket Number	US80118

To: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Applicant hereby **requests that the name of the applicant be corrected or updated under 37 CFR 1.46(c)(1), or that the applicant be changed under 37 CFR 1.46(c)(2),** in the above-identified application. **Requests under 37 CFR 1.46(c)(1) or (c)(2) cannot be submitted after payment of the issue fee or if the application has been patented.**

Please check the applicable box(es) below.

☐ 1. This request is to **correct or update the name of the applicant** (**under 37 CFR 1.46(c)(1)**) and includes:

☐ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) with the corrected or updated information shown with markings (*e.g.*, underlining for insertions, strikethrough for deletions). A Corrected Web-based ADS may be used.

Note: Requests under 37 CFR 1.46(c)(1) may be filed to correct typographical errors in the name of the § 1.46 applicant, or for updating the name of the § 1.46 applicant (*i.e.*, where there is no change in the applicant itself but just in the applicant's name). See the Manual of Patent Examining Procedure (MPEP) section 605.01.

■ 2. This request is to **change the applicant** (**under 37 CFR 1.46(c)(2)**) and includes:

■ An application data sheet (ADS) in accordance with 37 CFR 1.76(c) that identifies the changes with proper markings (underlining for insertions and strikethrough for deletions). A Corrected Web-based ADS may be used.

■ A Statement Under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent). See MPEP 325.

I am the

☐ applicant* ■ attorney or agent of record Registration number 68,009 ☐ attorney or agent acting under 37 CFR 1.34 Registration number _____

Signature /Calvin H Chai/

Typed or printed name Calvin H Chai

Date July 28, 2020

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. *Juristic entities must be represented by a patent practitioner (See 37 CFR 1.31, applicable to any paper filed on or after September 16, 2012 that is presented on behalf of a juristic entity, regardless of application filing date). Submit multiple forms if more than one signature is required, see below**.

☐ ** Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.36. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/AIA/96 (08-12)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: SHARP KABUSHIKI KAISHA, FG INNOVATION COMPANY LIMITED

Application No./Patent No.: 16/637693 Filed/Issue Date: 02-07-2020

Titled: USER EQUIPMENT, BASE STATION, AND RELATED METHODS

SHARP KABUSHIKI KAISHA, a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☐ The assignee of the entire right, title, and interest.

2. ☑ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☑ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   FG INNOVATION COMPANY LIMITED

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: XIAO et al. To: SHARP KABUSHIKI KAISHA

   The document was recorded in the United States Patent and Trademark Office at Reel 051757, Frame 0623, or for which a copy thereof is attached.

2. From: SHARP KABUSHIKI KAISHA To: SHARP KABUSHIKI KAISHA, FG INNOVATION COMPANY LIMITED

   The document was recorded in the United States Patent and Trademark Office at Reel 053272, Frame 0725, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Calvin H Chai/	2020-07-28
Signature	Date
Calvin H Chai	68,009
Printed or Typed Name	Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

DAINGEAN_0004327

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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: SHARP KABUSHIKI KAISHA, FG INNOVATION COMPANY LIMITED

Application No./Patent No.: 16/637693 Filed/Issue Date: 02-07-2020

Titled: USER EQUIPMENT, BASE STATION, AND RELATED METHODS

FG INNOVATION COMPANY LIMITED, a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☐ The assignee of the entire right, title, and interest.

2. ☑ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☑ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   SHARP KABUSHIKI KAISHA

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

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B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

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/Calvin H Chai/	2020-07-28
Signature	Date
Calvin H Chai	68,009
Printed or Typed Name	Title or Registration Number

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
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9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Acknowledgement Receipt

EFS ID:	40144815
Application Number:	16637693
International Application Number:	
Confirmation Number:	2923
Title of Invention:	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
First Named Inventor/Applicant Name:	FANGYING XIAO
Customer Number:	145688
Filer:	Calvin H Chai
Filer Authorized By:	
Attorney Docket Number:	US80118
Receipt Date:	29-JUL-2020
Filing Date:	07-FEB-2020
Time Stamp:	23:08:42
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	US80118200728ADS.pdf	150142 3db8c255f16f3ebe543e24aa4db5eee6c6b8bc10	no	8

Warnings:

DAINGEAN_0004331

Information:					
This is not an USPTO supplied ADS fillable form					
2	Power of Attorney	US80118200728POA.pdf	666441 60a357f82043180640f10ecca29d369f90fdddc2	no	3
Warnings:					
Information:					
3	Transmittal Letter	US80118200728TSF.pdf	194080 302ae4cb2a174c954baf302fd5e39026d3e5a4c6	no	2
Warnings:					
Information:					
4	Assignee showing of ownership per 37 CFR 3.73	US80118200728ASO.pdf	105216 9b7cd4b0345efe94be790a79c32d477a8287bc83	no	6
Warnings:					
Information:					
		Total Files Size (in bytes):	1115879		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	16/637693
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	FANGYING		XIAO	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Shanghai	Country of Residence i	CN

Mailing Address of Inventor:

Address 1	c/o SHARP UNIVERSAL TECHNOLOGY(SHANGHAI)CO.,LTD.
Address 2	No. 1111, Jinhai Rd., Pudong

City	Shanghai	State/Province	
Postal Code	201206	**Country** i	CN

Inventor 2 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	RENMAO		LIU	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Shanghai	Country of Residence i	CN

Mailing Address of Inventor:

Address 1	c/o SHARP UNIVERSAL TECHNOLOGY(SHANGHAI)CO.,LTD.
Address 2	No. 1111, Jinhai Rd., Pudong

City	Shanghai	State/Province	
Postal Code	201206	**Country** i	CN

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

PTO/AIA/14 (11-15)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	16/637693
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	145688		
Email Address	eoa-proce@scienbizip.com	Add Email	Remove Email
Email Address	eoa-cbd@scienbizip.com	Add Email	Remove Email
Email Address	eoa-procc@scienbizippc.com		Remove Email

Application Information:

Title of the Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS		
Attorney Docket Number	US80118	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	**Suggested Figure for Publication (if any)**	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	16/637693
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Please Select One:	(●) Customer Number	( ) US Patent Practitioner	( ) Limited Recognition (37 CFR 11.9)
Customer Number	145688		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	a 371 of international	PCT/CN2018/099379	2018-08-08

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[j] (if applicable)
201710683129.0	CN	2017-08-10	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

PTO/AIA/14 (11-15)
Approved for use through 04/30/2017. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	16/637693
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	16/637693
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

(●) Assignee	( ) Legal Representative under 35 U.S.C. 117	( ) Joint Inventor
( ) Person to whom the inventor is obligated to assign.	( ) Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	SHARP KABUSHIKI KAISHA		
Mailing Address Information For Applicant:			
Address 1	1, Takumi-cho, Sakai-ku		
Address 2			
City	Sakai City, Osaka	**State/Province**	
Country	JP	Postal Code	590-8522
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	16/637693
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Applicant 2

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

◉ Assignee	○ Legal Representative under 35 U.S.C. 117	○ Joint Inventor
○ Person to whom the inventor is obligated to assign.	○ Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:	
If the Applicant is an Organization check here. ☒	
Organization Name	FG INNOVATION COMPANY LIMITED

Mailing Address Information For Applicant:

Address 1	Flat 2623, 26/F Tuen Mun Central Square		
Address 2	22 Hoi Wing Road		
City	Tuen Mun, New Territories	**State/Province**	
Country HK		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	US80118
	Application Number	16/637693
Title of Invention	USER EQUIPMENT, BASE STATION, AND RELATED METHODS	

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Calvin H Chai/			Date (YYYY-MM-DD)	2020-07-28
First Name	Calvin	Last Name	Chai	Registration Number	68,009

Additional Signature may be generated within this form by selecting the Add button.

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/637,693	02/07/2020	FANGYING XIAO	US80118

CONFIRMATION NO. 2923

POA ACCEPTANCE LETTER

145688
SBPJ/ScienBiziP, P.C.
550 South Hope Street
Suite 2825
Los Angeles, CA 90071

OC00000011886777

Date Mailed: 08/03/2020

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/29/2020.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/dtdinh/

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
16/637,693	02/07/2020	2464	1580	US80118	10	1

CONFIRMATION NO. 2923

CORRECTED FILING RECEIPT

145688
SBPJ/ScienBiziP, P.C.
550 South Hope Street
Suite 2825
Los Angeles, CA 90071

OC000000118886780

Date Mailed: 08/03/2020

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

FANGYING XIAO, Shanghai, CHINA;
RENMAO LIU, Shanghai, CHINA;

Applicant(s)

SHARP KABUSHIKI KAISHA, Sakai City, JAPAN;
FG INNOVATION COMPANY LIMITED, Tuen Mun, HONG KONG;

Power of Attorney: The patent practitioners associated with Customer Number 145688

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/CN2018/099379 08/08/2018

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
CHINA 201710683129.0 08/10/2017

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 02/14/2020

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/637,693**

Projected Publication Date: Not Applicable

Non-Publication Request: No

Early Publication Request: No

Title

USER EQUIPMENT, BASE STATION, AND RELATED METHODS

Preliminary Class

370

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

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UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
16637693	N570	08/03/2020	US80118
	APP.FILE.REC	08/03/2020	US80118

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/637,693	02/07/2020	FANGYING XIAO	US80118	2923

145688 7590 04/01/2021

SBPJ/ScienBiziP, P.C.
550 South Hope Street
Suite 2825
Los Angeles, CA 90071

EXAMINER
LAFONTANT, GARY

ART UNIT	PAPER NUMBER
2646	

NOTIFICATION DATE	DELIVERY MODE
04/01/2021	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

eoa-cbd@scienbizip.com
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Office Action Summary	Application No. 16/637,693	Applicant(s) XIAO et al.	
	Examiner GARY LAFONTANT	Art Unit 2646	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☑ Responsive to communication(s) filed on 02/07/2020.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL.** 2b) ☑ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5) ☑ Claim(s) 1-10 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6) ☐ Claim(s) _____ is/are allowed.

7) ☑ Claim(s) 1,3,5-7 and 9-10 is/are rejected.

8) ☑ Claim(s) 2,4 and 8 is/are objected to.

9) ☐ Claim(s) _____ are subject to restriction and/or election requirement

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov.**

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☑ The drawing(s) filed on 02/07/2020 is/are: a)☑ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☑ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☑ All b)☐ Some** c)☐ None of the:

1.☑ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☑ Notice of References Cited (PTO-892)

2) ☑ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date _____.

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless the claimed invention was described in a patent issued under section 151, or in an application for patent published or deemed published under section 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

Claim(s) 1, 3, 5-7, 9 and 10 are rejected under **35 U.S.C. 102(a)(2)** as being anticipated by **Hong (US 2019/0342148 A1).**

Regarding Claim 1,

Hong discloses a method **(See [Abstract])** used in User Equipment (UE) **(Fig.1(UE)),** the UE **(Fig.1(UE))** being configured with a Master Cell Group (MCG) duplicated Signaling Radio Bearer (SRB) **(See Fig.4(SRB1); [0054]; [0084]; [0123]; UE configuring dual connectivity with duplicated SRB also used for secondary SCG),**

the MCG duplicated SRB **(See {0084]; SRB)** being associated with an MCG and a Secondary Cell Group (SCG) **(See [0084-0085]; secondary base station received SRB from a Master BS)** and configured to be used for uplink transmission via the SCG **(See [0087]; [0093]; [0113]; [0217]; configured to transmit data to secondary BS) ,** and

the method comprising:

detecting an SCG failure **(See [0089-0090]; [0100-0101]; [0140]; [0147]; [0151]; detecting a failure in the dual connectivity for the Secondary BS);**

and

reconfiguring the MCG duplicated SRB to be used fix uplink transmission via the MCG **(See [0137]; [0152]; [0155]; the UE continually use a configuration having been used before the RRC connection reconfiguration message is received in term of transmitting data through Master BS),**

or

triggering an MCG failure **(See [0138]; [0153]; service interruption).**

Regarding Claim 3, 7

Hong teaches all the features with respect to **Claim 1, 6** and **Hong** further teaches

reporting the SCG failure to a base station **(See [0089]; the UE may perform an operation to transmit a failure information message to the master BS),**

wherein the reporting the SCG failure to a base station **(See [0089]; the UE may perform an operation to transmit a failure information message to the master BS),** comprises:

transmitting the SCG failure information to the base station via the MCG by using the reconfigured MCG duplicated SRB **(See [0092]; receiving the failure information message from the Master BS),**

or

transmitting the SCG failure information to the base station through a Common Control Channel (CCCH) by using the MCG SRB.

(The term "or" can translate into at least one of the limitations separated by the term may be treated under examination)

Regarding Claim 5,

Hong teaches all the features with respect to **Claim 1** and **Hong** further teaches

About a User Equipment (**UE) (Fig.1(100))**

comprising

a transceiver **(Fig.7(720)(730)),**

a processor **(Fig.7(710)),** and

a memory **(Fig.1(100); a UE merely comprises a memory)**,

the processor storing instructions executable by the processor to cause the UE to perform the method **(See [0208-0210]; comprises instructions code to perform the method).**

Regarding Claim 6,

Hong teaches a method used in a base station **(Fig.1(MeNB)),** the base station **(Fig.1(MeNB))** being a Master Cell Group (MCG) base station **(See [0054]; [0104]; MeNB configured as MCG**) is using and communicating **(See [0054]; [0104]; configured to communicate with UE)** with User Equipment (UE) **(Fig.1(UE))** over an MCG duplicated Signaling Radio Bearer (SRB) **(See [0054]; [0084]; [0104]; dual SRB configuration for Primary BS and secondary BS),** the MCG duplicated SRB being associated with the MCG and a Secondary Cell Group (SCG) **(See [0084-0085];**

secondary base station received SRB from a Master BS) and configured to be used for uplink transmission via the SCG **(See [0093]; configured to transmit data to secondary BS)**, and

the method comprising:

receiving from the UE a report on an SCG failure **(See [0089-0090]; [0140]; [0151]; detecting a failure in the dual connectivity for the Secondary BS);**; and

reconfiguring the MCG duplicated SRB to receive uplink transmission via the MCG **(See [0137]; [0145]; the UE continually use a configuration having been used before the RRC connection reconfiguration message is received in term of transmitting data through Master BS).**.

Regarding Claim 9,

Hong teaches all the features with respect to **Claim 6** and **Hong** further teaches transmitting to the UE instruction information instructing the UE **(See [0089];[0100]; UE is configure to transmit failure message to the Master BS)** whether to perform uplink transmission via the MCG**(See [0089-0090]; [0101-0101]; transmission to Master BS is perform in UE uplink mode**),

when the SCG fails **(See [0089-0090]; [0100-0101]; when RRC cannot be established in secondary BS) .**

Regarding Claim 10,

Hong teaches all the features with respect to **Claim 6** and **Hong** further teaches

A base station **(See Fig.8; [0220]),** comprising a transceiver **(Fig.8(820)(830)),** a processor **(Fig.8(810)),** and a memory **(See Fig.8; [0220]); a Base Station merely comprises a memory),**

the processor storing instructions executable by the processor to cause the base station to perform the method **(See [0220-0221]).**

Allowable Subject Matter

Claims 2, 4 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in statutory independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GARY LAFONTANT whose telephone number is (571)272-3037. The examiner can normally be reached on 9:00AM -5:00PM.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lester Kincaid can be reached on 571-272-7922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see https://ppair-my.uspto.gov/pair/PrivatePair. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/GARY LAFONTANT/
Examiner, Art Unit 2646

Notice of References Cited	Application/Control No. 16/637,693	Applicant(s)/Patent Under Reexamination XIAO et al.	
	Examiner GARY LAFONTANT	Art Unit 2646	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-20190208474-A1	07-2019	Ali; Amaanat	H04W84/20	1/1
	B					
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/637,693	XIAO et al.
	Examiner	Art Unit
	GARY LAFONTANT	2646

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	03/27/2021								
	1	✓								
	2	O								
	3	✓								
	4	O								
	5	✓								
	6	✓								
	7	✓								
	8	O								
	9	✓								
	10	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/637,693	XIAO et al.
	Examiner	Art Unit
	GARY LAFONTANT	2646

CPC - Searched*		
Symbol	Date	Examiner
All	03/27/2021	GL

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
East	03/27/2021	GL

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner

/GARY LAFONTANT/ Examiner, Art Unit 2646	

US 20190342148A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2019/0342148 A1

HONG et al. (43) Pub. Date: Nov. 7, 2019

(54) METHOD FOR CONFIGURING DUAL-CONNECTIVITY BY TERMINAL, AND APPARATUS THEREFOR

(71) Applicant: **KT CORPORATION**, Gyeonggi-do (KR)

(72) Inventors: **Sung-pyo HONG**, Seoul (KR); **Woo-jin CHOI**, Seoul (KR)

(73) Assignee: **KT CORPORATION**, Gyeonggi-do (KR)

(21) Appl. No.: **16/300,557**

(22) PCT Filed: **May 11, 2017**

(86) PCT No.: **PCT/KR2017/004873**

§ 371 (c)(1),
(2) Date: **Nov. 10, 2018**

(30) **Foreign Application Priority Data**

May 12, 2016 (KR) 10-2016-0058157
Jul. 1, 2016 (KR) 10-2016-0083270
May 8, 2017 (KR) 10-2017-0057549

Publication Classification

(51) **Int. Cl.**

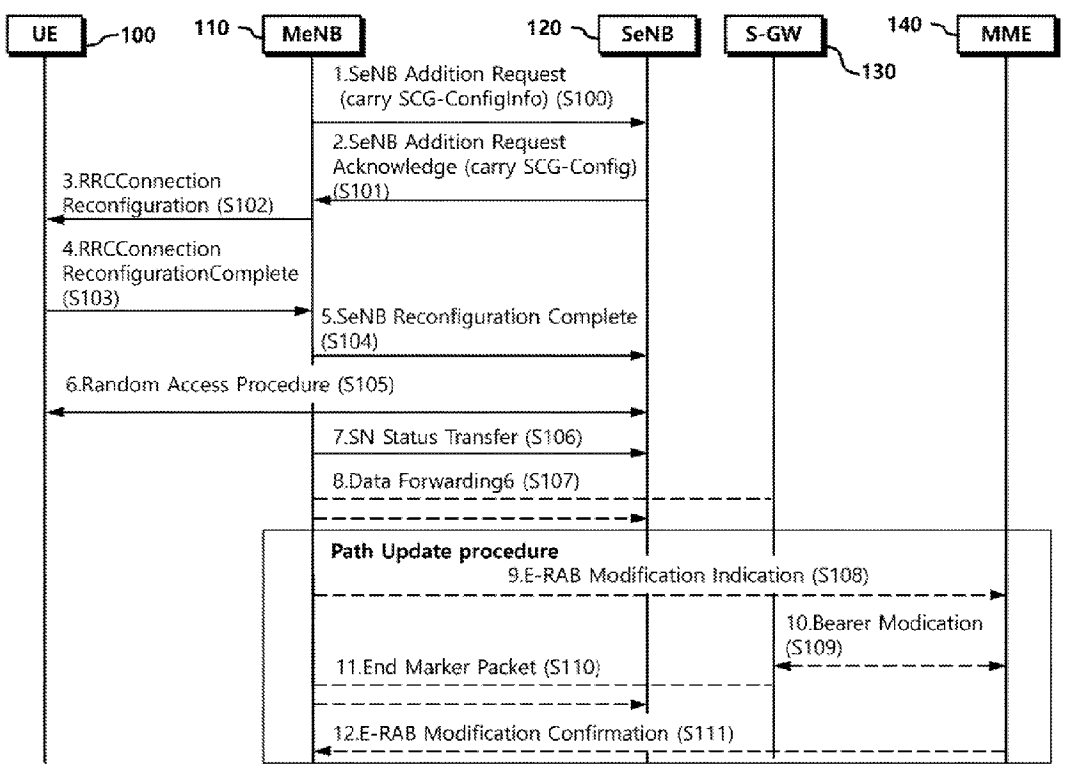
H04L 12/24	(2006.01)
H04W 76/27	(2006.01)
H04W 76/15	(2006.01)
H04W 28/02	(2006.01)

(52) **U.S. Cl.**

CPC ***H04L 41/0668*** (2013.01); ***H04W 76/27*** (2018.02); *H04W 88/06* (2013.01); ***H04W 76/15*** (2018.02); ***H04W 28/0252*** (2013.01); ***H04L 41/0803*** (2013.01)

(57) **ABSTRACT**

Provided are a method and apparatus for configuring dual-connectivity by a terminal, The method may include: performing configuration by adding a secondary base station signaling radio bearer (SRB); receiving a radio resource control (RRC) message including radio resource configuration information associated with a secondary base station or a secondary cell group through the secondary base station SRB; and transmitting a failure information message to a master base station when it is not possible to comply with the radio resource configuration information included in the RRC message.



DAINGEAN_0004359

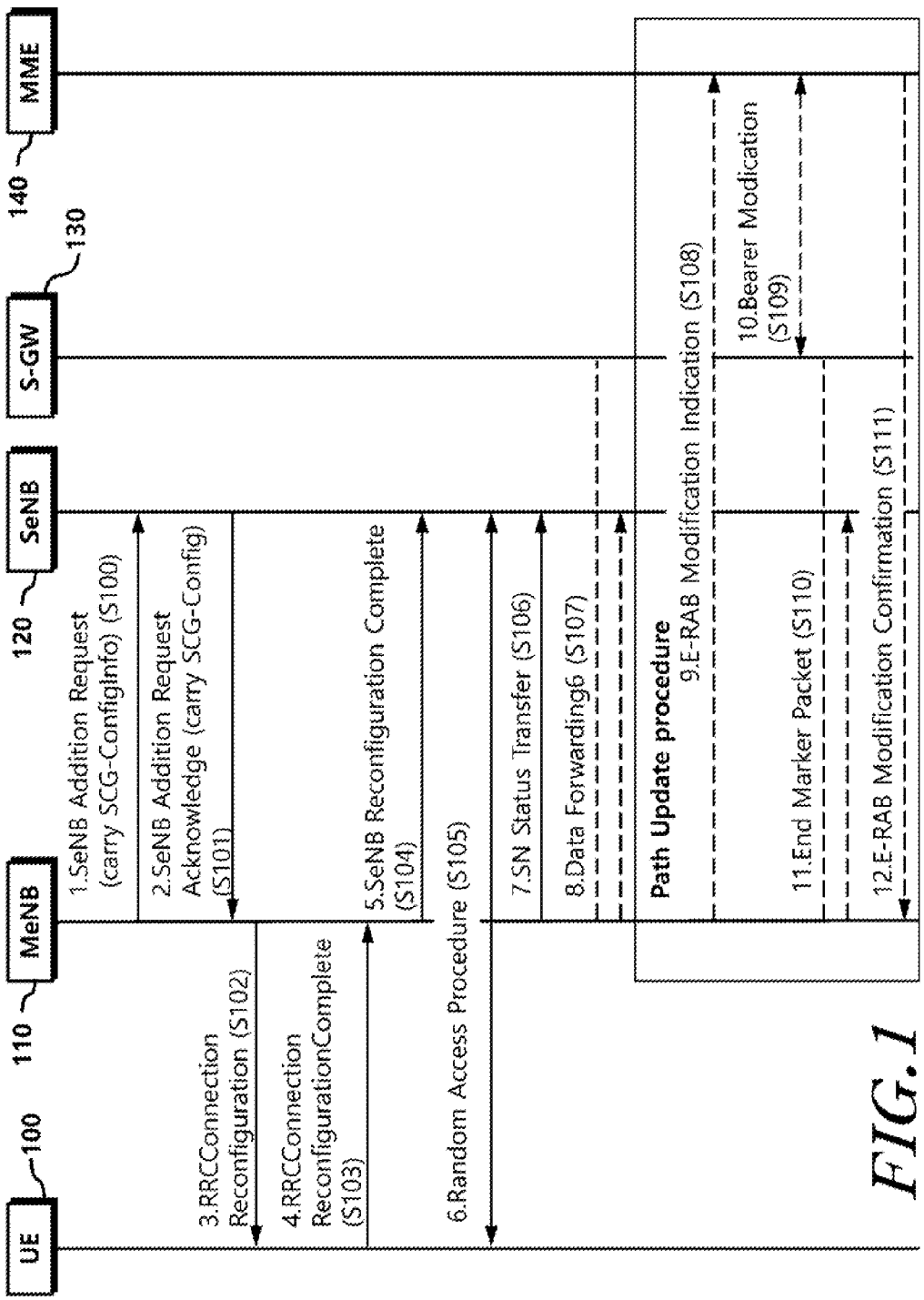
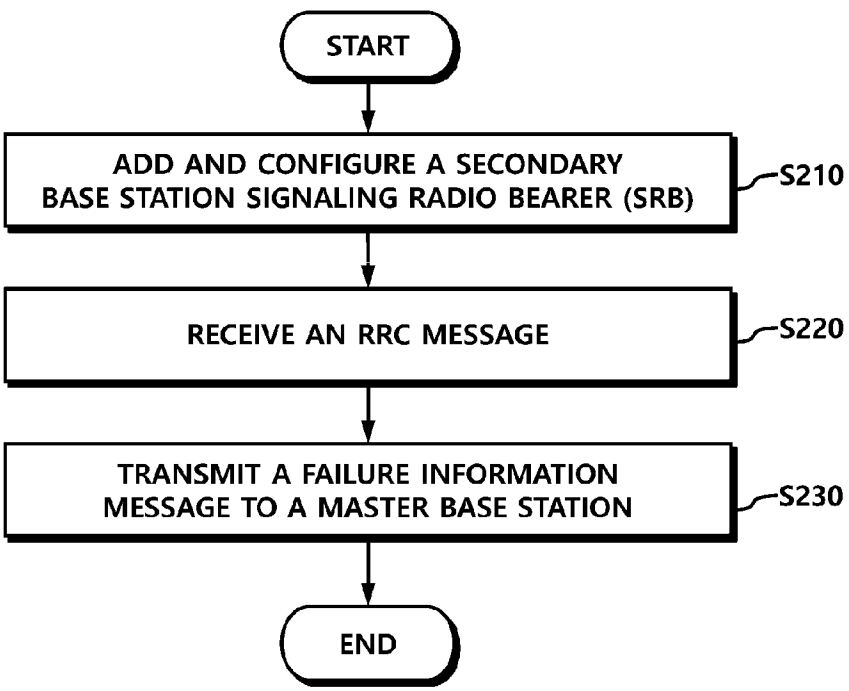


FIG. 1

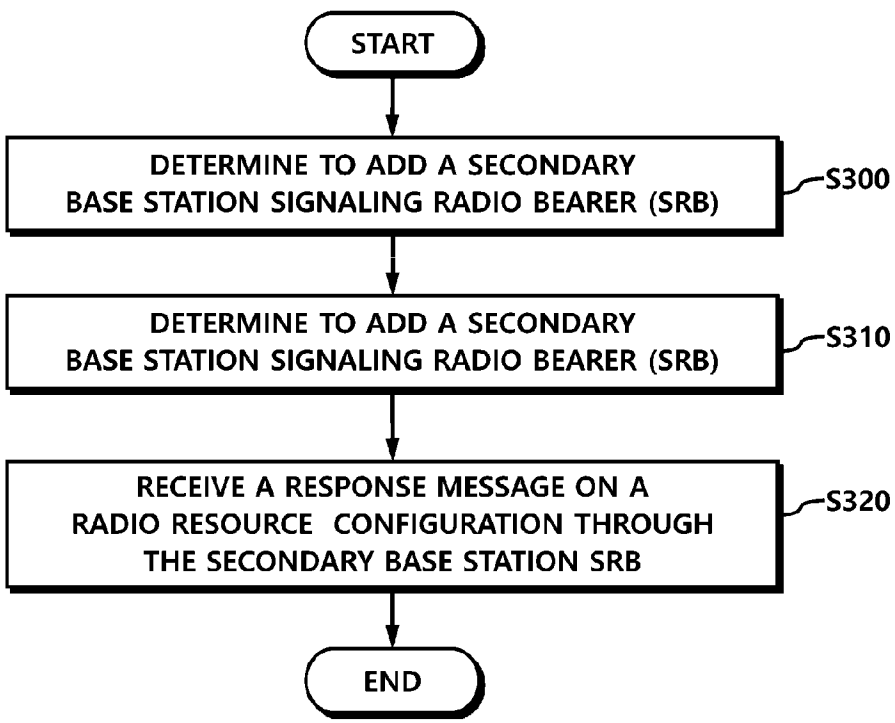
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FIG. 2



DAINGEAN_0004361

FIG.3



DAINGEAN_0004362

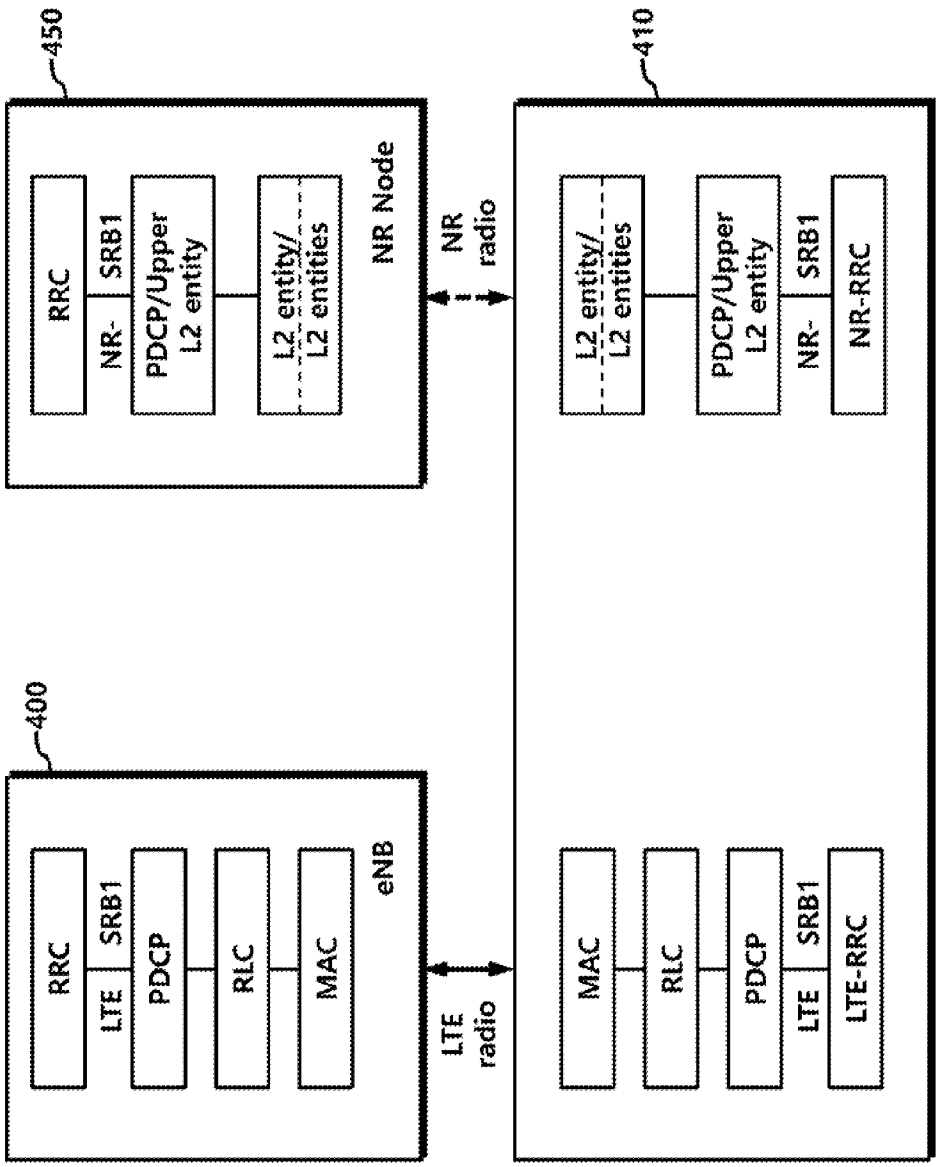


FIG. 4

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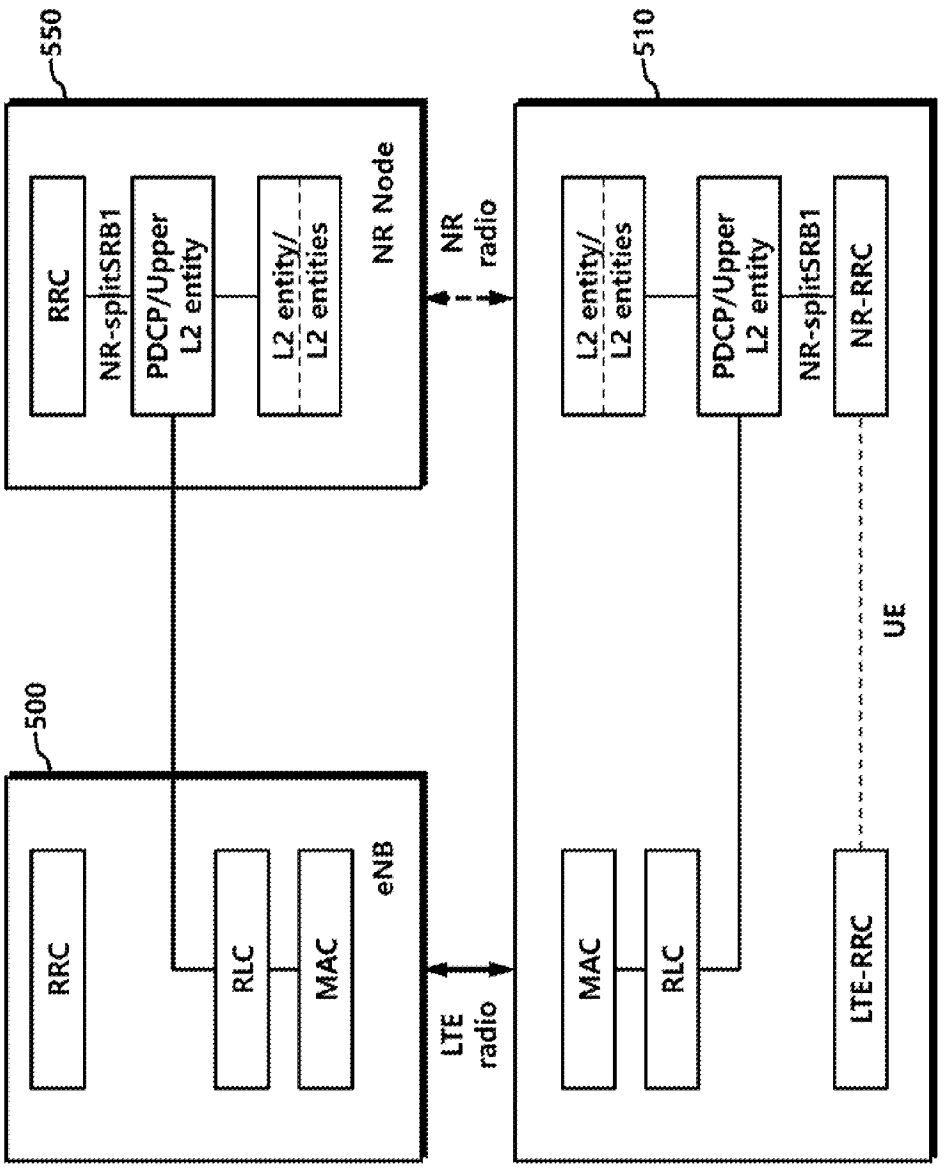


FIG.5

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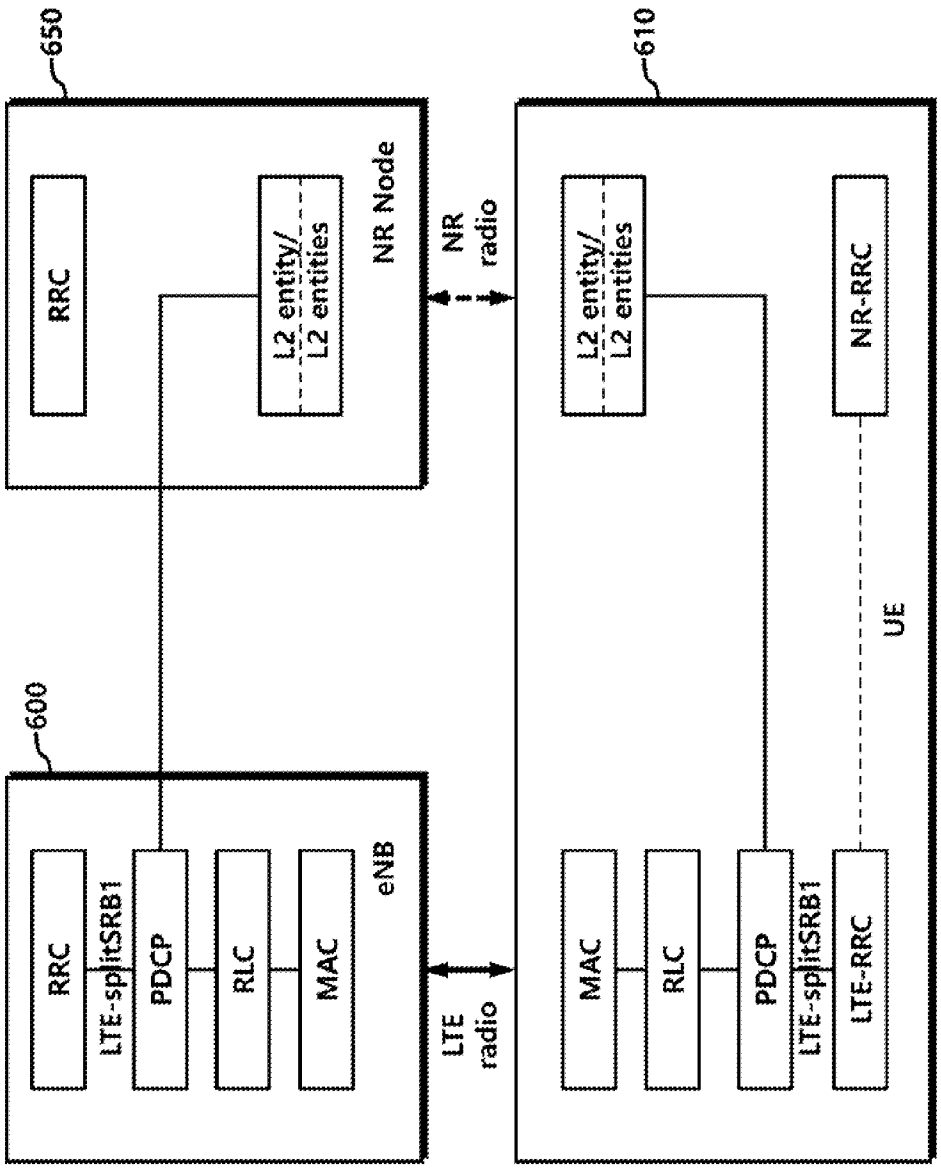
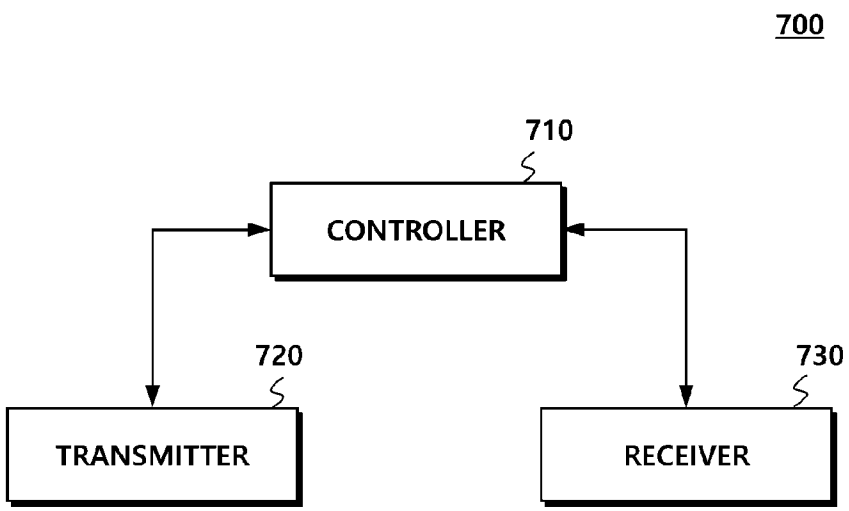


FIG.6

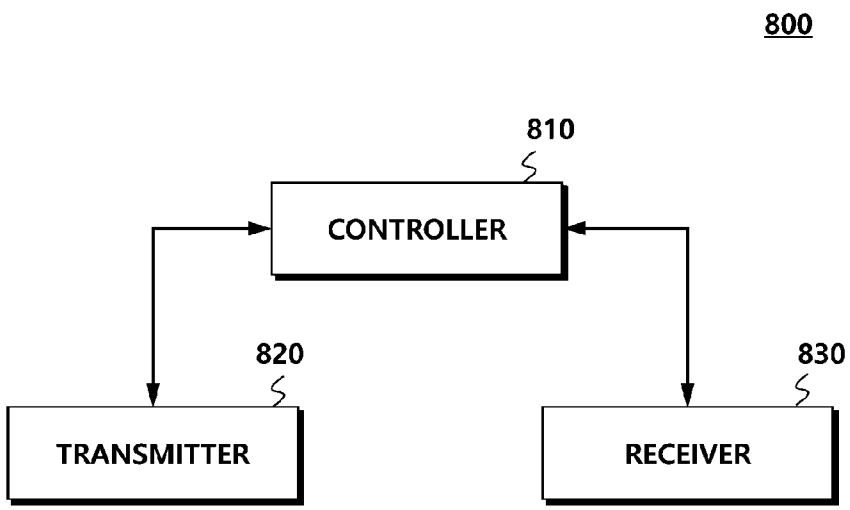
DAINGEAN_0004365

FIG. 7



DAINGEAN_0004366

FIG.8



DAINGEAN_0004367

METHOD FOR CONFIGURING DUAL-CONNECTIVITY BY TERMINAL, AND APPARATUS THEREFOR

TECHNICAL FIELD

[0001] The present disclosure relates to a method and apparatus for a user equipment configuring dual connectivity. In particular, the present disclosure relates to a method and apparatus for a user equipment configuring multi-connectivity by using a plurality of base stations that use radio access networks different from one another (e.g., radio access technologies different from one another.)

DESCRIPTION OF THE RELATED ART

[0002] Due to advances in communication systems, various types of wireless devices have been introduced to consumers such as companies and individuals.

[0003] Mobile communication systems have employed technologies related to the 3rd generation partnership project (3GPP), such as Long Term Evolution (LTE), LTE-Advanced, or the like. Such mobile communication systems have been designed for transmitting and receiving a large amount of various data, such as video data, radio data, or the like, at a high speed.

[0004] For transmitting and receiving a further large amount of data at an even higher speed, a technology has been needed to use small cells. In particular, a technology has been needed for enabling a user equipment to use both of i) a macro cell having a wide coverage and ii) a small cell having a relatively narrow coverage to transmit and receive data, thereby increasing traffic throughput of the user equipment. That is, such a technology may enable a user equipment to use a plurality of base stations including a base station providing a macro cell and a base station providing a small cell for transmitting and receiving data.

[0005] After LTE-Advanced, technologies for next generation radio access networks have been developed for enabling a user equipment to transmit and receiving even more data and providing higher Quality of Service (QoS). For example, 3GPP have developed 5G network technologies.

[0006] Such 5G network technologies (e.g., next generation technologies) are required to have comparability with user equipments and base stations employing typical network technologies in order to enable a user equipment to have communication services through both of the typical network and the 5G network.

[0007] A dual connectivity technology enables a user equipment to maintain connectivity with multiple base stations simultaneously. Due to the introduction of the 5G access network technology (e.g., next generation access network technology), it is necessary for improving such a dual connectivity technology to use base stations using different network technologies.

[0008] However, no method has been defined or introduced for enabling a user equipment to have dual connectivity of a base station employing typical network technologies and a base station employing the next generation network technologies.

DETAILED DESCRIPTION OF THE INVENTION

Technical Problem

[0009] The present disclosure addresses the above needs, as well as others, and proposes a specific procedure and operation for enabling a user equipment to have dual connectivity with a plurality of base stations.

[0010] In addition, the present disclosure is related to a method and apparatus for enabling a user equipment to have dual connectivity with a plurality of base stations including one employing different access network technologies from the other.

Technical Solution

[0011] In accordance with an aspect of the present disclosure to solve the above problems, a method of a user equipment may be provided for configuring dual connectivity. The method may include adding and configuring a secondary base station signaling radio bearer (SRB), receiving a radio resource control (RRC) message including radio resource configuration information on a secondary base station or a secondary cell group through the secondary base station SRB, and transmitting a failure information message to a master base station in case the user equipment is unable to comply with the radio resource configuration information included in the RRC message.

[0012] In accordance with another aspect of the present disclosure, a method of a secondary base station may be provided for controlling the dual connectivity of a user equipment. The method may include determining to add a secondary base station signaling radio bearer (SRB) to the user equipment, transmitting a radio resource control (RRC) message including radio resource configuration information on a secondary base station or a secondary cell group to the user equipment through the secondary base station SRB, and receiving a response message for a radio resource configuration through the secondary base station SRB if the user equipment successfully complies with a radio resource on the secondary base station, the user equipment configuring dual connectivity by using a master base station and the secondary base station.

[0013] In accordance with further another aspect of the present disclosure, a user equipment may be provided for configuring dual connectivity. The user equipment may include a controller additionally configuring a secondary base station signaling radio bearer (SRB), a receiver configured to receive a radio resource control (RRC) message including radio resource configuration information on a secondary base station or a secondary cell group through the secondary base station SRB, and a transmitter configured to transmit a failure information message to a master base station in case the user equipment is unable to comply with the radio resource configuration information included in the RRC message.

[0014] In accordance with still further another aspect of the present disclosure, a secondary base station may be provided for controlling dual connectivity of a user equipment. The base station may include a controller configured to determine to add a secondary base station signaling radio bearer (SRB) to the user equipment, a transmitter configured to transmit a radio resource control (RRC) message including radio resource configuration information on a secondary

base station or a secondary cell group to the user equipment through the secondary base station SRB, and a receiver configured to receive a response message for a radio resource configuration through the secondary base station SRB if the user equipment successfully complies with a radio resource on the secondary base station, the user equipment configuring the dual connectivity by using a master base station and the secondary base station.

Advantageous Effects

[0015] In accordance with embodiments of the present disclosure, a user equipment is able to configure dual connectivity with a plurality of base stations including one employing radio access network technologies different from the other, thereby efficiently providing high quality services

[0016] In accordance with embodiments of the present disclosure, a user equipment is able to configure dual connectivity with base stations including one employing radio access network technologies different from the other, thereby providing a communication service without errors.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. **1** is a signal flow diagram illustrating a procedure of adding a secondary base station according to a typical technology.

[0018] FIG. **2** is a flowchart illustrating operation of a user equipment according to some embodiments of the present disclosure.

[0019] FIG. **3** is a flowchart illustrating operation of a base station according to some embodiments of the present disclosure.

[0020] FIG. **4** is a diagram illustrating a dual connectivity signaling radio bearer (SRB) configuration according to an embodiment of the present disclosure.

[0021] FIG. **5** is a diagram illustrating a dual connectivity SRB configuration according to another embodiment of the present disclosure.

[0022] FIG. **6** is a diagram illustrating a dual connectivity SRB configuration according to further another embodiment of the present disclosure.

[0023] FIG. **7** is a block diagram illustrating a user equipment according to some embodiments of the present disclosure.

[0024] FIG. **8** is a block diagram illustrating a base station according to some embodiments of the present disclosure.

MODE FOR CARRYING OUT THE INVENTION

[0025] Hereinafter, the present preferred embodiments of the disclosure will be described in detail with reference to the accompanying drawings. In denoting elements of the drawings by reference numerals, the same elements will be referenced by the same reference numerals although the elements are illustrated in different drawings. In the following description of the disclosure, detailed description of known functions and configurations incorporated herein may be omitted when it may make the subject matter of the disclosure rather unclear.

[0026] In the present disclosure, a machine type communication (MTC) device may refer to a device that supports low cost (or low complexity), a device that supports coverage enhancement, or the like. The MTC device may refer to a device that supports low cost (or low complexity), a device that supports coverage enhancement, or the like. The MTC device may refer to devices defined in a predetermined category for supporting low cost (or low complexity) and/or coverage enhancement.

[0027] In other words, the MTC device may refer to a low cost (or low complexity) user equipment (UE) category/type newly defined in 3GPP Release-13 and performing LTE-based MTC-related operations. The MTC device of the present disclosure may refer to a UE category/type defined in or before 3GPP Release-12, which supports enhanced coverage in comparison with the typical LTE coverage or supports low power consumption, or may refer to a low cost (or low complexity) UE category/type newly defined in Release-13.

[0028] In the present disclosure, wireless communication systems are widely deployed to provide various communication services, such as a voice communication service, a packet data service, etc. The wireless communication system includes a user equipment (UE) and a base station (BS, or eNB). In the present disclosure, the UE is defined as a generic term including devices used in wireless communication, and therefore includes as well as UEs in the wideband code division multiple access (WCDMA), long term evolution (LTE), high speed packet access (HSPA), and the like, a mobile station (MS) in the global system for mobile communications (GSM), a user terminal (UT), a subscriber station (SS), a wireless device, or the like.

[0029] The BS or a cell generally refers to a station communicating with the UE. The BS or cell may be referred to as a Node-B, an evolved Node-B (eNB), a sector, a site, a base transceiver system (BTS), an access point, a relay node, a remote radio head (RRH), a radio unit (RU), a small cell, or the like.

[0030] That is, the BS or cell is defined as a generic term including as well as some areas or functions covered by a base station controller (BSC) in CDMA, a Node-B in the WCDMA, an evolved Node-B (eNB) or a sector (site) in the LTE, and the like, all of various coverage areas, such as a megacell, a macrocell, a microcell, a picocell, a femtocell and a relay node, RRH, RU, a small cell communication range, or the like.

[0031] Since each of the above-described various cells is controlled by a BS, therefore the BS may be classified into two categories. That is, the BS may be referred to i) an apparatus that provides a megacell, a macrocell, a microcell, a picocell, a femtocell, or a small cell, for a radio coverage area, or ii) the radio coverage area itself. In i), the BS may be referred to i) any or all apparatuses providing any radio coverage area and are controlled by one identical entity, or ii) any or all apparatus cooperate with each other to configure the radio coverage area. According to a method of establishing a radio coverage area, the BS may be referred to as an eNB, a RRH, an antenna, a RU, a low power node (LPN), a point, a transmission/reception point, a transmission point, a reception point, or the like. In ii), the BS may be a radio coverage area itself for transmitting or receiving a signal from UE perspective or neighboring BS perspective.

[0032] Accordingly, the megacell, the macrocell, the microcell, the picocell, the femtocell, or the small cell, the RRH, the antenna, the RU, the LPN, the point, the eNB, the transmission/reception point, the transmission point, or the reception point are collectively referred to as the BS.

[0033] In the present disclosure, the UE and the BS are entities performing transmission or reception operation used to embody the technology and technical spirit described in

the present disclosure. The UE and the BS are defined as a generic term and not limited to specific terms or words. The UE and the BS are entities performing uplink or downlink operation used to embody the technology and technical spirit described in the present disclosure. The UE and the BS are defined as a generic term and not limited to a specific term or word. The uplink (UL) refers to a data transmission/reception scheme performed by a UE to/from a BS, and the downlink (DL) refers to a data transmission/reception scheme performed by a BS to/from a UE.

[0034] Any of multiple access techniques may be applied to wireless communication systems according to the present disclosure, and therefore no limitation is imposed on them. Various multiple access techniques, such as code division multiple access (CDMA), time division multiple access (TDMA), frequency division multiple access (FDMA), orthogonal frequency division multiple access (OFDMA), OFDM-TDMA, OFDM-FDMA, OFDM-CDMA, or the like, can be used in wireless communication systems according the present disclosure. At least one of embodiments of the present disclosure may be applied to resource allocation in as well as asynchronous wireless communication evolving into LTE/LTE-advanced and IMT-2020 beyond GSM, WCDMA, and HSPA, synchronous wireless communication evolving into CDMA, CDMA-2000, and UMB. The present disclosure is not construed to be limited to or limited to a particular wireless communication field and is construed as including all technical fields to which the spirit of the present disclosure may be applied.

[0035] Uplink transmission and downlink transmission may be performed based on i) a time division duplex (TDD) technique performing the transmission through different time slots, or ii) a frequency division duplex (FDD) technique performing the transmission through different frequencies.

[0036] Further, in some systems, such as the LTE or LTE-advanced, a related standard specification defines an UL and a DL to be established based on a single carrier or a pair of carriers. The UL and/or the DL may transmit control information through control channels, such as a physical DL control channel (PDCCH), a physical control format indicator channel (PCFICH), a physical hybrid ARQ indicator channel (PHICH), a physical UL control channel (PUCCH), an enhanced physical DL control channel (EPDCCH), or the like. The UL and/or the DL may transmit data information through data channels, such as a physical DL shared channel (PDSCH), a physical UL shared channel (PUSCH), or the like.

[0037] Meanwhile, control information may be transmitted through an enhanced PDCCH (EPDCCH) or extended PDCCH (EPDCCH).

[0038] In the present disclosure, the cell may refer to a coverage of a signal transmitted from a transmission point or a transmission/reception point, a component carrier having the coverage of the signal transmitted from the transmission point or the transmission/reception point, or the transmission/reception point itself.

[0039] A wireless communication system according to some embodiments of the present disclosure may be i) a coordinated multi-point transmission/reception system (CoMP system) in which two or more transmission/reception points cooperate to transmit a signal, ii) a coordinated multi-antenna transmission system, or iii) a coordinated multi-cell communication system. The CoMP system may include at least two multiple transmission/reception points and UEs.

[0040] The multiple transmission/reception points may be at least one RRH that is connected to a BS or macrocell (hereinafter, referred to as 'eNB') through an optical cable or an optical fiber and thereby controlled in a wired manner, and that has high transmission power or low transmission power in a macrocell area.

[0041] Hereinafter, the DL may denote communication or a communication path from multiple transmission/reception points to a UE, or the UL may refer to communication or a communication path from the UE to the multiple transmission/reception points. In the DL, a transmitter may be a part of multiple transmission/reception points and a receiver may be a part of the UE. In the UL, a transmitter may be a part of the UE and a receiver may be a part of multiple transmission/reception points.

[0042] Hereinafter, transmission and reception of a signal through a channel such as the PUCCH, the PUSCH, the PDCCH, or the PDSCH, may be described as the transmission and reception of the PUCCH, the PUSCH, the PDCCH, or the PDSCH.

[0043] In addition, hereinafter, a description of transmitting or receiving a PDCCH or a description of transmitting or receiving a signal through the PDCCH may include meaning of transmitting or receiving an EPDCCH or transmitting or receiving a signal through the EPDCCH.

[0044] That is, a physical DL control channel used herein may denote a PDCCH or an EPDCCH and may denote both of the PDCCH and the EPDCCH.

[0045] Also, for convenience of description, an EPDCCH according to at least one of embodiments of the present disclosure may be applied to a description or an embodiment including a PDCCH, and the PDCCH may be applied to a description or an embodiment including the EPDCCH.

[0046] Meanwhile, higher layer signaling described below includes radio resource control (RRC) signaling transmitting RRC information containing an RRC parameter.

[0047] The eNB performs DL transmission to UEs. The eNB may transmit a PDSCH which is a primary physical channel for unicast transmission, and a PDCCH for transmitting i) DL control information such as scheduling required to receive the PDSCH and ii) scheduling approval information for transmission through an UL data channel (for example, a PUSCH). Hereinafter, transmission and reception of a signal through each channel will be described as transmission and reception of a corresponding channel.

[0048] LTE Dual Connectivity operation

[0049] Typical LTE technologies support dual connectivity for a UE to simultaneously use radio resources of two BSs. A dual connectivity operation for a multiple RX/TX UE in an RRC connected state is configured to utilize the radio resources provided by two different schedulers connected to two BSs connected to each other through non-ideal backhaul.

[0050] A UE in the dual connectivity may provide services through two BSs. For example, the UE may perform communication by using a master BS (MeNB) and a secondary BS (SeNB). The MeNB may provide an RRC connection to the UE and may denote a reference BS for performing a handover. The SeNB denotes a BS providing an additional radio resource to the UE.

[0051] To provide a SeNB radio resource to a UE, a procedure for adding a SeNB is used for establishing a UE context to the SeNB.

[0052] FIG. **1** is a diagram illustrating a procedure of adding a secondary BS according to a typical technology.

[0053] Each operation will be described with reference to FIG. **1**.

[0054] 1. The MeNB **110** decides to request the SeNB **120** to allocate radio resources for a specific E-RAB, indicating E-RAB characteristics (E-RAB parameters, TNL address information corresponding to the UP option) at step **S100**. In addition, the MeNB **110** indicates within SCG-ConfigInfo a MCG configuration (including security algorithm for SCG bearer) and the entire UE capabilities for UE capability coordination to be used as basis for the reconfiguration by the SeNB **120**, but does not include SCG configuration. The MeNB **110** may provide the latest measurement results for the SCG cell(s) requested to be added. The SeNB **120** may reject the request.

[0055] 2. If an RRM entity in the SeNB **120** is able to admit the resource request, it allocates respective radio resources and, dependent on the bearer option, respective transport network resources at step **S101**. The SeNB **120** triggers Random Access to perform synchronization of the SeNB **120** radio resource configuration. The SeNB **120** provides the new radio resource of SCG in SCG-Config to the MeNB **110**. For SCG bearers, together with S1 DL TNL address information for the respective E-RAB and security algorithm, X2 DL TNL address information for split bearers is provided.

[0056] 3. If the MeNB **110** endorses the new configuration, the MeNB **110** transmits an RRCConnecnonReconfiguranon message to the UE including the new radio resource configuration of SCG according to the SCG-Config at step **S102**.

[0057] 4. The UE applies the new configuration and replies with an RRCConnecnonReconfiguranonComplete message at step **S103**. In case the UE is unable to comply with (part of) the configuration included in the RRCConnecnonReconfiguranon message, it performs a reconfiguration failure procedure.

[0058] 5. The MeNB **110** informs the SeNB **120** that the UE has completed the reconfiguration procedure successfully at step **S104**.

[0059] 6. The UE performs synchronization towards the PSCell of the SeNB **120** at step **S105**. The UE transmits the RRCConnecnonReconfiguranonComplete message and performs the Random Access procedure towards the SCG is not defined. The successful RA procedure towards the SCG is not required for a successful completion of the RRC Connection Reconfiguration procedure.

[0060] 7./8. In case SCG bearers, and dependent on the bearer characteristics of the respective E-RAB, the MeNB (**110**) may take actions to minimize service interruption due to activation of dual connectivity (Data forwarding, SN Status Transfer) at steps **S106** and **S107**.

[0061] 9.-12. For SCG bearers, the update of the UP path towards the EPC is performed at steps **S108** to **S111**.

[0062] If the MeNB **110** transmits anRRCConnectionReconfiguration message including a new radio resource configuration of a secondary cell group in **S102**, the UE **100** applies the new configuration, as in **S103**. In case the UE **100** is unable to comply with (part of) the configuration included in the RRCConnectionReconfiguration message, it performs a reconfiguration failure procedure.

[0063] The typical dual connectivity of the LTE may be provided based on coordination between two LTE BSs. In such a typical dual connectivity, the MeNB **110** is able to understand an RRC message of the SeNB **120**. Further, the MeNB **110** generates a final RRC message in consideration of coordination between the UE capabilities and the SeNB **120** and transmits it to the UE **100**. Therefore, it is possible to efficiently utilize the radio resources of the two BSs. The RRC message is provided through only radio interfaces of the UE **100** and the MeNB **110**.

[0064] NR(New Radio)

[0065] Recently, the 3rd generation partnership project (3GPP) has carried out a "Study on New Radio Access Technology" (hereinafter, for convenience of description, referred to as a new radio (NR)). As architecture for the NR and a requirement for migration, a RAN architecture is required to support tight interworking between the NR and the LTE. A LTE dual connectivity technology is expected to be reused for tight interworking between the NR and the LTE. However, a number of evolutionary features over a physical layer, a layer 2 protocol and a relevant procedure are introduced into the NR as new radio access. Accordingly, when the tight interworking between the NR and the LTE is supported, it is very difficult in reality to make an LTE BS support all features of the NR that will evolve in the future. This is the reason why, whenever the NR BS evolves, updating the LTE BS together also places an excessive burden on the currently constructed LTE BS. Accordingly, in dual connectivity configured based on the LTE BS and the NR BS, the LTE BS is required to be able to operate even if the LTE BS cannot understand an RRC message generated by the NR BS. In this case, the LTE BS cannot identify a change of a radio resource configuration of the NR BS. Therefore, it is impossible to configure a UE to exceed UE capabilities.

[0066] In addition, in the typical dual connectivity technology, it is able to transmit an RRC message through only an MeNB. For example, in a case where a radio resource of a SeNB is changed by requesting of the MeNB, it is possible to configure radio resource configuration information of a SeNB through the MeNB. Accordingly, in order to change the radio resource of the NR BS, there is transmission delay generated between BSs at all times.

[0067] In addition, the LTE-based dual connectivity is provided based on coordination between LTE BSs. That is, both BSs can support LTE features as an LTE BS. In addition, there is a problem that the NR BS cannot directly generate and transmit an RRC message.

[0068] The present disclosure is proposed to solve this problem and provides a method and apparatus for configuring a signaling radio bearer to an LTE BS and an NR BS and a UE, in order to provide radio resource control signaling for an LTE-NR dual connection operation supporting tight interworking between the LTE and the NR. In addition, the present disclosure provides a method of effectively processing radio connection in a signaling process between an LTE BS and an NR BS and/or between a UE and any of the LTE BS and the NR BS.

[0069] In addition, the present disclosure provides a method and apparatus for adding a NR BS supporting tight interworking between the LTE and the NR.

[0070] The embodiments of the present disclosure may be applied to, as well as LTE mobile communication UEs, a next generation mobile communication (for example, 5G mobile communication) UEs.

[0071] For convenience of description, hereinafter, a BS may be referred to as an LTE BS, which is an eNodeB of LTE/E-UTRAN, or in a 5G radio network in which a central unit (CU) and a distribute unit (DU) are separated, a gNodeB, a NR Node or a NR BS (CU, DU, or an entity in which the CU and the DU are configured with one logical entity, hereinafter, for convenience of description, referred to as "NR BS", but all entities described above may be included in the scope of the present disclosure.)

[0072] Furthermore, in order to describe a method of establishing dual connectivity of an LTE BS and a NR BS using radio access technologies different from each other, in the present disclosure, if necessary, the LTE BS may be referred to as a master BS and the NR BS may be referred to as a secondary BS. In this case, the present disclosure may also be applied to dual connectivity between LTE BSs. Accordingly, the same may be applied to a case where the secondary BS is an LTE BS.

[0073] Accordingly, the LTE BS and the NR BS are separately described below, and when it is necessary to specifically describe an operation according to the dual connectivity, the LTE BS is described as a master BS (MeNB) and the NR BS is described as a secondary BS (SeNB). The name of each BS is for convenience of understanding, and therefore the LTE BS may denote an eNB and the NR BS may denote a gNB. That is, in the present disclosure, the separate BSs are described with the intention of distinguishing between base stations using different radio access technologies, but the terms are not limited thereto.

[0074] Following scenarios may be considered for a core network connection in dual connectivity for the NR.

[0075] If the NR is integrated into the LTE and connected through EPC, a control plane may be connected between an LTE BS and an EPC entity (MME) and a user plane may be separated from a core network or a radio network.

[0076] If the LTE is integrated into the NR and connected through NG-Core (5G core network), a control plane may be connected between a NR BS and an NG-Core control plane entity and a user plane may be separated from a core network or a radio network.

[0077] If the NR is integrated into the LTE and connected through NG-Core (5G core network), a control plane may be connected between an LTE BS and an NG-Core control plane entity and a user plane may be separated from a core network or a radio network.

[0078] Following three cases may be considered as dual connectivity or multi-connectivity (hereinafter, for convenience of description, referred to as "dual connectivity", but the present disclosure includes a case where two or more dual connectivity are provided.)

[0079] LTE(Master Node)—NR(Secondary Node)

[0080] NR(Master Node)—NR(Secondary Node)

[0081] NR(Master Node)—LTE(Secondary Node)

[0082] For convenience of description, the present disclosure describes the LTE(Master Node)—NR(Secondary Node) case in which well-established LTE coverage can be utilized as an example case. However, as described above, this selection is for convenience of description, and therefore, either NR(Master Node)—NR(Secondary Node) case or NR(Master Node)—LTE(Secondary Node) case is also included within the scope of present disclosure.

[0083] FIG. **2** is a flowchart illustrating operation of a UE according to some embodiments of the present disclosure.

[0084] Referring to FIG. **2**, a UE configuring dual connectivity may add and configure a secondary BS signaling radio bearer (SRB) at step S**210**. For example, according to secondary BS SRB configuration information included in an RRC message received from a master BS, the UE may add the secondary BS SRB and configure it in the UE. As described above, the secondary BS denotes a NR BS. Meanwhile, the addition of the secondary BS SRB may be determined by the secondary BS. That is, the secondary BS may determine whether to add the secondary BS SRB to the UE.

[0085] The addition of the secondary BS SRB may be configured when the master BS performs a secondary BS addition procedure.

[0086] The master BS and the secondary BS are BSs using radio access technologies different from each other. For example, the master BS may be an eNB, and the secondary BS may be a gNB.

[0087] In addition, the UE may receive a radio resource control (RRC) message including radio resource configuration information on the secondary BS or a secondary cell group through the secondary BS SRB at step S**220**. For example, the UE may receive radio resource configuration information on the secondary BS through the additionally configured secondary BS SRB. As another example, the UE may receive radio resource configuration information on the secondary cell group through the secondary BS SRB. The radio resource configuration information on the secondary BS or the secondary cell group may be received being included in an RRC message.

[0088] Here, the secondary cell group (SCG) denotes one or more cells associated with the secondary BS, and one or more cells associated with the master BS may referred to as a master cell group. That is, when configuring the dual connectivity, the UE may use one cell of a BS or a plurality of cells each controlled by a corresponding BS.

[0089] In case the UE is unable to comply with radio resource configuration information included in an RRC message, the UE may perform an operation to transmit a failure information message to the master BS at step S**230**. For example, the UE may comply with, in the UE, a secondary BS or a secondary cell group configuration by using the received radio resource configuration information. Meanwhile, it may not be possible to configure dual connectivity by using the received radio resource configuration information due to any reason. In this case, the UE may transmit a failure information message to the master BS and inform it of dual connectivity configuration failure of the UE.

[0090] In addition, when the UE fails to configure the secondary BS radio resource because the UE is unable to comply with the radio resource configuration included in an RRC message, the radio resource on the secondary BS or the secondary cell group may be suspended. For example, the radio resources on the secondary BS or the secondary cell group, which are the target resources to be suspended, may be at least one of a secondary cell group data radio bearer (DRB), a secondary cell group SRB, a part of a secondary cell group of a split DRB, and a part of a secondary cell group of a split SRB. The failure of the UE to configure the

secondary BS radio resource because the UE is unable to comply with radio resource configuration information included in the RRC message denotes the failure of the RRC configuration because the UE is not allowed to comply with the radio resource configuration information included in the RRC message.

[0091] In addition, the failure information message transmitted to the master BS may include cause information on the failure of configuring the secondary BS radio resource.

[0092] In this case, the secondary BS may recognize the configuration failure by receiving the failure information message from the master BS.

[0093] Meanwhile, if the UE successfully complies with the received radio resource configuration information and performs the radio resource configuration, the UE may transmit confirmation information on radio resource configuration success to the secondary BS through the secondary BS SRB.

[0094] FIG. **3** is a flowchart illustrating operation of a BS according to some embodiments of the present disclosure.

[0095] Referring to FIG. **3**, a secondary BS controls dual connectivity of a UE. Such a secondary BS may determine to add a secondary BS signaling radio bearer (SRB) to the UE at step **S300**. As described above, the secondary BS denotes a NR BS. Meanwhile, the addition of the secondary BS SRB may be determined by the secondary BS. That is, the secondary BS may determine whether to add the secondary BS SRB to the UE. When a master BS performs a secondary BS addition procedure, the UE may add a secondary BS SRB.

[0096] The master BS and the secondary BS are BSs using radio access technologies different from each other. For example, the master BS may be an eNB and the secondary BS may be a gNB.

[0097] The secondary BS may transmit a radio resource control (RRC) message including radio resource configuration information on the secondary BS or a secondary cell group to the UE through the secondary BS SRB at step **S310**. For example, the secondary BS may transmit radio resource configuration information on the secondary BS to the UE through the additionally configured secondary BS SRB. As another example, the secondary BS may transmit radio resource configuration information on the secondary cell group through the secondary BS SRB. The radio resource configuration information on the secondary BS or the secondary cell group may be transmitted being included in an RRC message.

[0098] Here, the secondary cell group (SCG) denotes one or more cells associated with the secondary BS, and one or more cells associated with the master BS may referred to as a master cell group. That is, when configuring the dual connectivity, the UE may use one cell of each BS or a plurality of cells each controlled by a corresponding BS.

[0099] If the UE successfully complies with the radio resource on the secondary BS, the secondary BS may receive a response message for the radio resource configuration from the UE through the secondary BS SRB at step **S320**. Through this, the UE may configure dual connectivity by using the master BS and the secondary BS.

[0100] It may not be possible to configure dual connectivity by using the received radio resource configuration information due to any reason. In this case, the UE may transmit a failure information message to the master BS for informing the master BS of dual connectivity configuration failure in the UE. The failure information message transmitted to the master BS may include cause information on the secondary BS radio resource configuration failure. In this case, the secondary BS may identify the cause of the failure by receiving information on the secondary BS radio resource configuration failure from the master BS.

[0101] In addition, when the UE fails to configure the secondary BS radio resources because the UE is unable to comply with the radio resource configuration included in an RRC message, the radio resource on the secondary BS or the secondary cell group may be suspended. For example, the radio resources on the secondary BS or the secondary cell group, which are target resources to be suspended, may be at least one of a secondary cell group data radio bearer (DRB), a secondary cell group SRB, a part of a secondary cell group of a split DRB, and a part of a secondary cell group of a split SRB. At this time, the failure of the second BS radio resource configure because the UE is unable to comply with radio resource configuration information included in the RRC message denotes the failure of the RRC configuration because the UE is not allowed to comply with the radio resource configuration information in the RRC message.

[0102] Through operations described above, a UE may be able to configure dual connectivity by using a plurality of BSs that use radio access network technologies different from one another.

[0103] Hereinafter, more various embodiments for operations of the UE and the BS in each step described above will be described.

[0104] In typical LTE dual connectivity, each LTE node has responsibility for UE resource configuration and allocation of a corresponding LTE node (cell group). An MeNB and a SeNB may understand each other's RRC configuration for a UE. The MeNB is used as basic data for reconfiguration by SeNB in SCG-ConfigInfo and indicates an MCG configuration and overall UE capabilities for performing UE capability coordination. The SeNB provides the MeNB with a new radio resource of a SCG in SCG-Config.

[0105] However, the NR, as new radio access, may introduce a number of evolutionary features over a physical layer, a layer 2 protocol and a relevant procedure. Accordingly, when the tight interworking between NR and LTE is supported, it may not be proper in reality to make an LTE BS understand and support all features of the NR that will evolve in the future. A LTE technology and NR technology can evolve independently depending on a corresponding use case. Accordingly, except for some information elements for coordination between LTE BSs and NR BSs, it is necessary for the LTE BSs not to be required to understand all NR configurations.

[0106] For example, for coordination with the NR BS, the LTE BS may transmit to the NR BS specific information elements to be used by the NR BS as basic data for NR radio resource reconfiguration. As another example, the NR BS may separate information elements to be transmitted to the LTE BS for coordination with the LTE BS from NR configuration information (or NR reconfiguration information) for configuring an NR radio resource of the UE. Then, the NR BS separately transmit the information elements and the NR configuration information to the LTE BS. The LTE BS may transmit them to a UE through interfaces between the LTE BS and the UE. As another example, the LTE BS may separate information elements to be transmitted to the NR

BS for coordination with the NR BS and LTE configuration information (or LTE reconfiguration information) for configuring an LTE radio resource of the UE. Then, the LTE BS may separately transmit the information elements ant eh LTE configuration information to the NR BS. The NR BS may transmit them to a UE through interfaces between the NR BS and the UE. For another example, NR configuration information for configuring an NR radio resource of the UE may be transmitted to the LTE BS being included in a container. The LTE BS may transparently transmit this information to the UE. As another example, NR configuration information for configuring an NR radio resource of the UE may be directly transmitted to the UE through interfaces between the NR BS and the UE by the NR BS.

[0107] In order to add an NR BS, as in the example described above, the NR configuration information (e.g., radio resource configuration information) for configuring the NR radio resource of the UE may be transmitted to the LTE BS being included in the container. The LTE BS may transmit, to the UE, LTE configuration information for configuring the LTE radio resource of the UE along with NR configuration information for configuring the NR radio resource of the UE. For example, the LTE BS may transmit radio resource-dedicated configuration information for configuring an LTE radio resource, in which NR configuration information for configuring an NR radio resource is included, to the UE. As another example, the LTE BS may separately transmit radio resource-dedicated configuration information for configuring an LTE radio resource and NR radio resource-dedicated configuration information for configuring an NR radio resource, to the UE. For example, the UE having received an RRC message through interfaces between the LTE BS and the UE may transmit an RRC message (or LTE radio resource-dedicated configuration information) including LTE radio resource-dedicated configuration information from an LTE PDCP entity of the UE to an LTE RRC entity. An RRC message (or NR radio resource-dedicated configuration information) including NR radio resource-dedicated configuration information may be transmitted from an LTE PDCP entity of the UE to an LTE RRC entity. As another example, the UE having received an RRC message through interfaces between the LTE BS and the UE may transmit an RRC message (or LTE radio resource-dedicated configuration information) including LTE radio resource-dedicated configuration information and an RRC message (or NR radio resource-dedicated configuration information) including NR radio resource-dedicated configuration information, from an LTE PDCP entity of the UE, to an LTE RRC entity. An LTE RRC entity of the UE may transmit an RRC message (or NR radio resource-dedicated configuration information) including NR radio resource-dedicated configuration information to an NR RRC entity. As another example, the UE having received an RRC message through interfaces between the LTE BS and the UE may transmit an RRC message (or LTE radio resource-dedicated configuration information) including LTE radio resource-dedicated configuration information and an RRC message (or NR radio resource-dedicated configuration information) including NR radio resource-dedicated configuration information, from an LTE PDCP entity of the UE, to an LTE RRC entity. The LTE RRC entity of the UE may comply with a new radio resource according to NR radio resource-dedicated configuration information.

[0108] Meanwhile, the NR BS may directly perform NR radio resource control of the UE. The NR BS may perform one or more control functions among an NR cell/cell group/transmission point/transmission point group/transmission and/or reception point/transmission and/or reception point group/TRP/antenna/antenna group/beam addition/modification/release/management, NR measurement, NR measurement reporting, NR resource allocation, NR radio bearer addition/correction/release, NR radio resource configuration, and NR mobility control. The NR BS may perform one or more control functions described above for the UE.

[0109] In order to configure an NR BS (addition) radio resource for the UE or in order to reconfigure an NR BS (addition) radio resource for the UE, the following methods are may be used independently or in combination.

[0110] 1. Using LTE BS Signaling Radio Bearer (SRB)

[0111] For example, a NR BS may transmit an NR RRC message (e.g., an RRC message generated by the NR BS) to a UE through an LTE BS. To do this, for a DL RRC message, the NR BS (or an RRC entity of the NR BS) may transmit an NR RRC message including an NR RRC container, NR RRC IEs, NR RRC IEs to the LTE BS. The LTE BS (or an RRC entity of the LTE BS) may transmit an RRC message including an NR RRC container, NR RRC IEs, and/or NR RRC IEs to the UE (or an RRC entity of the UE) through an LTE SRB. The LTE RRC may transmit, to the UE, the RRC message that includes the NR RRC container, NR RRC IEs, and/or NR RRC IEs to the UE, and that is included in an RRC reconfiguration message with a transparent container.

[0112] This method is advantageous in that RRC configuration information of the NR BS can be transmitted to the UE while reducing changes of the LTE BS. However, this method increases delays resulted from data transmission between the LTE BS and the NR BS. In addition, the NR BS is required to receive a confirmation message for the NR RRC configuration of the UE from the LTE BS. This also causes delays.

[0113] In order to solve this, if an RRC message including an NR RRC container, NR RRC IEs, and/or NR RRC IEs is transmitted to the UE (or an RRC entity of the UE), the LTE BS may indicate that the RRC entity of the UE directly should transmit an RRC reconfiguration confirmation message to the NR BS.

[0114] For example, an LTE RRC entity of the UE having received an RRC message including an NR RRC container, NR RRC IEs, and/or NR RRC IEs through an LTE SRB transmits/submits it to an NR RRC entity. The NR RRC entity complies with a new configuration. The NR RRC entity replies to an RRC reconfiguration confirmation message through interfaces between the UE and the NR BS.

[0115] As another example, an RRC entity of the UE having received an RRC message including an NR RRC container, NR RRC IEs, and/or NR RRC IEs through an LTE SRB complies with a new configuration. The RRC entity of the UE replies to an RRC reconfiguration confirmation message through interfaces between the UE and the NR BS.

[0116] The RRC reconfiguration message (or an RRC message including an NR RRC container, NR RRC IEs, and/or NR RRC IEs) may include information for indicating such an operation of the UE by the NR BS (or the LTE BS).

[0117] For example, the RRC reconfiguration message (or an RRC message including an NR RRC container, NR RRC

IEs, and/or NR RRC IEs) may include information for indicating the UE to generate/enable/activate an NR RRC entity.

[0118] As another example, if the UE receives an RRC message including an NR RRC container, NR RRC IEs, and/or NR RRC IEs (or an RRC message including information indicating an initial NR addition configuration (NR configuration setup)), the UE causes an NR RRC entity to enable/activate an NR addition configuration (or the UE may establish/generate the NR RRC entity.)

[0119] As another example, if the UE receives an RRC message including information indicating NR radio resource release, the UE may cause an NR RRC entity to be disabled/deactivated/released.

[0120] As another example, an RRC reconfiguration message (or an RRC message including an NR RRC container, NR RRC IEs, and/or NR RRC IEs) may include information for indicating the UE from an NR RRC entity to transmit an RRC confirmation message through interfaces between the UE and the NR BS.

[0121] As another example, an RRC reconfiguration message (or an RRC message including an NR RRC container, NR RRC IEs, and/or NR RRC IEs) may include NR BS SRB configuration information for transmitting an RRC confirmation message from an NR RRC entity through interfaces between the UE and the NR BS.

[0122] 2. SRB configuration through NR BS

[0123] For example, an NR BS may transmit an NR RRC message to a UE through interfaces between the NR BS and the UE. To do this, when LTE-NR dual connectivity is configured to a UE (or, when an NR addition radio resource is configured), an NR BS may configure an SRB (e.g., SRB1) between the UE and the NR BS. This denotes that the NR BS determines to add an SRB (e.g., SRB1) between the UE and the NR BS to a corresponding UE, and generates configuration information for this. For reference, a SRB1 is performed in RRC connection establishment in the typical LTE, but SRB1 establishment between the NR BS and the UE (hereinafter, a signaling radio bearer configured to transmit data through interfaces between the NR BS and the UE is referred to as NR-SRB1, but is not limited thereto.) may be configured through an RRC reconfiguration message configuring LTE-NR dual connectivity (configuring an NR addition radio resource).

[0124] When security is activated, a PDCP (or an L2 entity over NR) is required to perform integrity protection and ciphering on all RRC messages over the NR-SRB1 (or SRB1/SRB2). It can be considered that LTE-NR dual connectivity is applied to an RRC connected UE. Accordingly, a PDCP (or an L2 entity (a higher entity) over NR) is required to perform integrity protection and ciphering for all RRC messages over the NR-SRB1 (or SRB1/SRB2).

[0125] To do this, for the NR-SRB1, it is required to always active security from the start. An LTE BS is required not to establish this bearer before activating security for the corresponding bearer. The LTE BS is required not to request NR BS addition before activating security. The NR BS may establish an NR-SRB1 according to an NR BS addition request of the LTE BS.

[0126] For example, when requesting NR BS addition, the LTE BS transmits (or calculates and then transmits) an NR BS key (e.g., NR-K_{eNB}) to the NR BS. The NR BS selects an integrity protection algorithm and/or a ciphering algorithm. Then, the selected integrity protection algorithm and the ciphering algorithm (or identification information for the integrity protection algorithm and the ciphering algorithm) by which the NR-SRB1 is serviced to the UE are transmitted to the UE through the LTE BS. The LTE BS (or NR BS) indicates a counter (SCG counter or NR counter) for the UE counting a key value associated with the NR-SRB1 to the UE. The UE counts an NR BS key. The UE counts a key value (NR-K_{RRCint}, NR-K_{RRCenc}) associated with the NR-SRB1. The UE configures a lower layer (PDCP or L2 entity over NR) to apply an integrity protection algorithm, ciphering algorithm, NR-K_{RRCint}, NR-K_{RRCenc}.

[0127] FIG. **4** is a diagram illustrating a dual connectivity SRS configuration according to an embodiment of the present disclosure.

[0128] For example, referring to FIG. **4**, an L2 entity of NR **450** may include an RLC entity of LTE **400**, one or two entities defined by redistributing LTE MAC entity functions. FIG. **4** shows that each of an LTE-RRC entity and an NR-RRC entity is configured in a UE **410**, but it is also within the scope of the present disclosure that a single RRC entity/layer is configured in the UE **410**.

[0129] If a single RRC entity/layer is configured in the UE **410**, data may be transmitted through an NR-SRB1 for an RRC message received from an NR BS **450** and a corresponding response RRC message. If two RRC entities are configured in the UE **410**, data may be transmitted through an NR-SRB1 for an RRC message received from an NR BS **450** and a corresponding response RRC message. The NR BS **450** may preferentially process the NR-SRB1 over a DRB. For example, a specific logical channel identification information logicalchannelIdentity) value may be designated to the NR-SRB1. As another example, logical channel identification information (logicalchannelIdentity) value (for example, 1) identical to the SRB1 may be designated to an NR-splitSRB1. As another example, SRB identification information (SRB-identity) value (for example, 1) identical to the SRB1 may be designated to an NR-SRB1. As another example, a logical channel configuration (e.g., priority(1 or 2), prioritisedBitRate(infinite)) value identical or similar to the SRB1 may be designated to an NR-SRB1. As another example, logical channel identification information identical to the SRB1 is included, but information for the UE identifying that this is a SCG SRB1 may be included.

[0130] As another example, logical channel identification information different from the SRB1 is included, but logical channel identification information identical to the SRB1 may be included.

[0131] The NR BS **450** may transmit to the UE **410** an NR RRC message including one or more control functions among an NR cell/cell group/transmission point/transmission point group/transmission and/or reception point/transmission and/or reception point group/TRP/antenna/antenna group/beam addition/modification/release/management, NR measurement, NR measurement reporting, NR resource allocation, NR radio bearer addition/correction/release, NR radio resource configuration, and NR mobility control. For a DL RRC message, the NR BS (or an RRC entity of the NR BS) **450** may transmit to the UE **410** an NR RRC message including an NR RRC container, NR RRC IEs, and/or NR RRC IEs through the NR-SRB1.

[0132] If the UE receives the NR RRC message (e.g., RRC connection reconfiguration message) through the NR-SRB1, the UE may comply with a new configuration by using the following methods independently or in combination. An NR

RRC message includes radio resource configuration information for the NR BS. For example, as described above, in the case of dual connectivity, an NR RRC message may include secondary BS (NR BS) radio resource configuration information.

[0133] 2-1) Methods of Complying with a New Configuration Through a Single RRC Entity in a UE

[0134] The UE may configure an NR radio resource through the RRC entity.

[0135] When an MeNB transmits to a UE an RRC message including a new radio resource configuration of a SCG in the typical LTE dual connectivity, the UE performs a reconfiguration failure procedure in case the UE is unable to comply with a configuration (or it's part) included in an RRC connection reconfiguration message.

[0136] The reconfiguration failure procedure in LTE is performed as follows.

[0137] In case a UE is unable to comply with a configuration (or it's part) included in an RRC connection reconfiguration message, the UE continually use a configuration having been used before the RRC connection reconfiguration message is received. If security has not been activated, an operation leaving an RRC CONNECTED state is performed by considering a release cause as other. If not, a connection re-establishment procedure is initiated.

[0138] Thus, since, in the typical LTE, the reconfiguration failure causes a UE to transition into an idle mode or to perform an RRC connection re-establishment procedure, and then results in service interruption.

[0139] Meanwhile, there is a possibility that NR may fail in an NR radio resource configuration procedure due to various causes. Accordingly, when failure occurs in an NR radio resource configuration procedure due to an arbitrary reason, it may be not efficient for a UE to transit into an idle mode or perform an RRC connection re-establishment procedure.

[0140] In order to solve this, if the UE fails in an NR configuration included in an NR RRC message (or in case the UE is unable to comply with the NR configuration included in an NR RRC message due to an arbitrary reason), a reconfiguration failure procedure should not be triggered. That is, NR RRC configuration failure should not trigger LTE RRC configuration failure. For example, if fails in an NR RRC configuration, a UE may transmit an RRC message (e.g., a SCG failure information message, a UE assistance message or an NR failure information/NR status message newly to be defined) including an NR RRC configuration failure cause to an NR BS. As another example, if fails in an NR RRC configuration, a UE may transmit an RRC message (e.g., a SCG failure information message, a UE assistance message or an NR failure information/NR status message newly to be defined) including an NR RRC configuration failure cause to an LTE BS. That is, if a UE fails in a radio resource configuration of a secondary BS by using an RRC message received through an SRB of a secondary BS. the UE may transmit corresponding failure information to a master BS.

[0141] Hereinafter, description on this will be more specifically given.

[0142] The received RRC message includes configuration information (for example, one or more of NR cell configuration information, NR bearer configuration information, control information for NR random access, NR measurement configuration information, NR mobility control and NR radio resource-dedicated configuration information) for configuring an NR radio resource. Hereinafter, for convenience of description, configuration information for adding an NR BS in dual connectivity or information for reconfiguring an NR radio resource through a secondary BS SRB are referred to as secondary BS radio resource configuration information, NR radio resource configuration information, NR configuration information or configuration information.

[0143] For example, in a case where an RRCConnectionReconfiguration message received through a master BS SRB includes NR radio resource configuration information, a UE (e.g., an RRC entity of the UE) performs an NR configuration.

[0144] As another example, in a case where an RRCConnectionReconfiguration message received through a secondary BS SRB includes NR radio resource configuration information, a UE (e.g., an RRC entity of the UE) performs an NR configuration.

[0145] In examples described above, in case the UE is unable to comply with the NR configuration, the UE continually use a (NR) configuration having been used before an RRC connection reconfiguration message is received (before NR configuration information is received.)

[0146] As another example, in case a UE (RRC) is unable to comply with an NR configuration, the using of the NR radio resource is suspended/stopped/held/released. The NR radio resource may include at least one of a secondary cell group data radio bearer (DRB), a secondary cell group SRB, a part of a secondary cell group of a split DRB, and a part of a secondary cell group of a split SRB.

[0147] As another example, in case a UE (RRC) is unable to comply with an NR configuration, the RRC transmits an RRC message including an NR RRC configuration failure cause to the LTE BS. The LTE BS transfers it to the NR BS.

[0148] As another example, in case a UE (RRC) is unable to comply with an NR configuration, the RRC may directly transmit an RRC message including an NR RRC configuration failure cause to the NR BS through interfaces between the UE and the NR BS.

[0149] 2-2) Methods of Complying with a New Configuration Through Two RRC Entities in a UE

[0150] As described above, NR may include independently evolutionary features other than the LTE. An LTE RRC and an NR RRC may be configured so that a UE can effectively implement those features.

[0151] When an MeNB transmits to a UE an RRC message including a new radio resource configuration of a SCG in the typical LTE dual connectivity, the UE performs a reconfiguration failure procedure in case the UE is unable to comply with a configuration (or it's part) included in an RRC connection reconfiguration message. A reconfiguration failure procedure in the LTE is performed as follows.

[0152] In case a UE is unable to comply with a configuration (or it's part) included in an RRC connection reconfiguration message, the UE continually use a configuration having been used before the RRC connection reconfiguration message is received. If security has not been activated, an operation leaving an RRC CONNECTED state is performed by considering a release cause as other. If not, a connection re-establishment procedure is initiated.

[0153] Thus, since, in the typical LTE, the reconfiguration failure causes the UE to transition into an idle mode or to perform an RRC connection re-establishment procedure, and then results in service interruption.

[0154] Meanwhile, there is a possibility that NR may fail in an NR radio resource configuration procedure due to various causes. Accordingly, when failure occurs in an NR addition procedure due to an arbitrary reason, it may be ineffective for a UE to transition into an idle mode or perform an RRC connection re-establishment procedure.

[0155] In order to solve this, if the UE fails in an NR configuration included in an NR RRC message (or in case the UE is unable to comply with an NR configuration included in an NR RRC message due to an arbitrary reason), a reconfiguration failure procedure should not be triggered. NR RRC configuration failure should not trigger LTE RRC configuration failure. If fails in an NR RRC configuration, the UE may transmit an RRC message (e.g., a SCG failure information message, a UE assistance message or an NR failure information/NR status message newly to be defined) including an NR RRC configuration failure cause to an NR BS (or an LTE BS). As another example, in case the UE (RRC) is unable to comply with the NR configuration, the RRC transmits an RRC message including an NR RRC configuration failure cause to the LTE BS. The LTE BS transmits it to the NR BS.

[0156] Hereinafter, description on this will be more specifically given.

[0157] If a received RRCConnectionReconfiguration message includes configuration information for configuring NR radio resource, the UE (NR RRC) performs the NR configuration.

[0158] As another example, in case the UE is unable to comply with the NR configuration, the UE continually use a (NR) configuration having been used before an RRC connection reconfiguration message is received (before NR configuration information is received.)

[0159] As another example, in case the UE (NR RRC) is unable to comply with the NR configuration, the using of the NR radio resource is suspended/stopped/held/released. The NR radio resource may include at least one of a secondary cell group data radio bearer (DRB), a secondary cell group SRB, a part of a secondary cell group of a split DRB, and a part of a secondary cell group of a split SRB.

[0160] As another example, in case the UE (NR RRC) is unable to comply with the NR configuration, the NR radio resource is released.

[0161] As another example, in case the UE (NR RRC) is unable to comply with the NR configuration, the NR RRC indicates NR reconfiguration failure to an LTE RRC. The LTE RRC transmits an RRC message including an NR RRC configuration failure cause to the LTE BS. The LTE BS transmits it to the NR BS.

[0162] As another example, in case the UE (NR RRC) is unable to comply with the NR configuration, the NR RRC may directly transmit an RRC message including an NR RRC configuration failure cause to the NR BS through interfaces between the UE and the NR BS.

[0163] Hereinafter, other examples on NR radio link failure will be described.

[0164] If radio link problem (failure) over an NR physical layer is detected, a UE may indicate the NR physical layer failure to an RRC entity. The RRC entity may indicate an RRC message including a failure cause for the NR physical layer failure to an LTE BS through an LTE SRB.

[0165] Hereinafter, another example on NR addition failure will be described in detail.

[0166] If experiences NR addition failure, the UE may inform a BS of it. For example, if experiences NR addition failure, the UE may inform an LTE BS of it through interfaces between the UE and the LTE SB. The LTE BS transfers it to an NR BS. As another example, if experiences NR addition failure, the UE may inform a NR BS of it through interfaces between the UE and the NR BS.

[0167] For example, when receiving an RRC connection reconfiguration message including NR addition information (for example, one or more of NR cell configuration information, NR bearer configuration information, control information for NR random access, and NR radio resource-dedicated configuration information), the UE starts a timer for detecting NR addition failure. This timer is included in the NR addition information. When this timer expires, an NR failure procedure may be initiated.

[0168] When the NR failure procedure is initiated, the UE may perform one or more of the following operations.

[0169] All of NR radio bearer, radio connection, radio flow, and NR transmission are suspended again.

[0170] NR medium access control (MAC) is reset again.

[0171] The timer stops when received is an RRC connection reconfiguration message including NR addition information again (for example, one or more of NR cell configuration information, NR bearer configuration information, control information for NR random access, and NR radio resource-dedicated configuration information).

[0172] Transmission of an NR failure information message (or a SCG failure information message or an RRC message, for convenience of description, hereinafter, referred to as "NR failure information message", but using a SCG failure information message or other RRC messages is also included within the scope of the present disclosure.) is initiated again.

[0173] If the UE initiates transmission of the NR failure information message, the UE includes a failure type. And, it is set as the NR radio addition failure.

[0174] The NR radio addition failure may denote failure to access the NR due to a cause different from the above described NR reconfiguration failure.

[0175] As described above, if fails in an NR radio resource configuration, the UE may transmit it to a BS through various operations. In addition, the UE may perform corresponding operations according to the failure.

[0176] Hereinafter, another example on NR addition will be described in detail.

[0177] The NR may establish radio bearer/radio connection/radio flow using the NR first according to the use of high frequencies and suspend a corresponding connection. Thereafter the NR may indicate that NR transmission should be initiated through radio bearer/radio connection/radio flow transmitting actual data.

[0178] For example, the NR may transmit an RRC connection reconfiguration message for establishing radio bearer/radio connection/radio flow using the NR and receive a confirmation message in response to this, and the NR may transmit to the UE an RRC connection reconfiguration message differentiated from it and including information indicating data transmission through radio bearer/radio connection/radio flow using the NR. For example, information indicating to initiate transmission by selecting any of data transmission through the LTE and data transmission through

the NR for a specific radio bearer/radio connection/radio flow may be included in the RRC connection reconfiguration message.

[0179] As described above, according to embodiments of the present disclosure, NR RRC configuration failure (or NR RRC connection failure/NR radio resource addition failure/NR radio link failure) should not trigger LTE RRC configuration failure.

[0180] 3. SRB configuration through an NR BS and an LTE BS

[0181] The NR may include radio communication features different from the LTE, and an LTE BS may not understand an RRC message generated by the NR BS.

[0182] The NR BS may directly transmit to a UE an NR RRC message including one or more control functions among an NR cell/cell group/transmission point/transmission point group/transmission and/or reception point/transmission and/or reception point group/TRP/antenna/antenna group/beam addition/modification/release/management, NR measurement, NR measurement reporting, NR resource allocation, NR radio bearer addition/correction/release, NR radio resource configuration, and NR mobility control.

[0183] However, the NR may be constructed even at a high frequency band (e.g., a high frequency of 6 GHz or more). In this case, fast SINR drops may occur according to link blockage of a high frequency band and high transmission loss, and a problem may be caused when an NR RRC is transmitted. To solve this problem, an NR RRC message should be transmitted by using all of interfaces between the NR BS and the UE and interfaces between the LTE BS and the UE in accordance with embodiments of the present disclosure.

[0184] FIG. **5** is a diagram illustrating a dual connectivity SRS configuration according to another embodiment of the present disclosure.

[0185] Referring to FIG. **5**, for example, when LTE-NR dual connectivity (or when configuring an NR addition radio resource) is configured in a UE **510**, an NR BS **550** may configure an SRB (e.g., SRB1 type) capable of the UE **510** using all of an LTE BS **500** and the NR BS **550**. The SRB capable of using all of the LTE BS **500** and the NR BS **550**, that is, a signaling radio bearer configured such that the NR BS may use all of the LTE BS and the NR BS is, for convenience of description, hereinafter, referred to as an NR-splitSRB1. The setting up of the NR-splitSRB1 should be configured through an RRC reconfiguration message configuring (reconfiguring) LTE-NR dual connectivity (configuring an NR addition radio resource).

[0186] When security is activated, a PDCP (or an L2 entity over the NR) may be required to perform integrity protection and ciphering on all RRC messages over the NR-splitSRB1, in consideration of that LTE-NR dual connectivity is applied to an RRC connected UE **510**. Accordingly, a PDCP (or an (higher) L2 entity over the NR) is required to perform integrity protection and ciphering for all RRC messages over the NR-splitSRB1.

[0187] To do this, for the NR-splitSRB1, it is required to always activate security from the start. The NR BS **550** is required not to establish this bearer before activating security. The LTE BS **500** is required not to request NR BS addition before activating security. The NR BS **550** is required not to request to add the NR-splitSRB1 to LTE BS **500** before activating security. The NR BS **550** may establish the NR-splitSRB1 according to an NR BS addition request of the LTE BS **500**. In addition, the NR BS **550** may establish the NR-splitSRB1 if necessary.

[0188] For example, when NR BS addition is required, the LTE BS **500** transmits (or calculates and then transmits) an NR BS key (e.g., NR-K_{eNB}) to the NR BS **550**. The NR BS **550** selects an integrity protection algorithm and/or a ciphering algorithm. Then, the selected integrity protection algorithm and/or the ciphering algorithm (or identification information for the integrity protection algorithm and/or the ciphering algorithm) by which the NR-splitSRB1 is serviced to the UE **510** are transmitted to the UE **510** through the LTE BS **500**. The LTE BS **500** (or NR BS **550**) indicates a counter (SCG counter or NR counter) for the UE **510** counting a key value associated with the NR-splitSRB1. The UE **510** counts an NR BS key. The UE **510** counts a key value (NR-K_{RRCint}, NR-K_{RRCenc}) associated with an NR-SRB1. The UE **510** configures a lower layer (PDCP or L2 entity over the NR) to apply an integrity protection algorithm, ciphering algorithm, NR-K_{RRCint}, NR-K_{RRCenc}.

[0189] As another example, the NR BS **550** may indicate information for configuring the NR-splitSRB1 to the LTE BS **500**. As described above, the LTE BS **500** may not understand an NR RRC container/NR RRC IEs of the NR BS **550**. Accordingly, the NR BS **550** may contain information for indicating the LTE BS **500** to configure the NR-splitSRB1 in a signaling message over interfaces between the NR BS **550** and the LTE BS **500**. When receiving information for indicating to configure the NR-splitSRB1, the LTE BS **500** may indicate information for configuring the NR-splitSRB1 to the UE **510**. The LTE BS **500** may indicate that the UE **510** should preferentially process the NR-splitSRB1 over a DRB. For example, a specific logical channel identification information (logicalchannelIdentity) value may be designated to the NR-splitSRB1. The UE **510** should preferentially process a logical channel designated as the NR-splitSRB1 over a DRB. As another example, an logical channel identification information (logicalchannelIdentity) value (for example, 1) identical to the SRB1 may be designated to the NR-splitSRB1. As another example, information for processing with a priority identical to the SRB1 may be indicated to the NR-splitSRB1. As another example, information for indicating a signaling bearer is may be indicated to the NR-splitSRB1. As another example, information for processing with logical channel identification information (logicalchannelIdentity) value different from the SRB1 is designated to the NR-splitSRB1, but information for processing with a priority identical to the SRB1 may be indicated. For example, logical channel identification information identical to the SRB1 may be included. As another example, an SRB identification information (SRB-identity) value (for example, 1) identical to the SRB1 may be designated to the NR-splitSRB1. As another example, a logical channel configuration (e.g., priority(1 or 2), prioritisedBitRate(infinite)) value identical or similar to the SRB1 may be designated to the NR-splitSRB1. As another example, logical channel identification information identical to the SRB1 is included, but information for the UE identifying an entity for the NR-split SRB1 may be included.

[0190] As another example, logical channel identification information different from the SRB1 is included, but logical channel identification information identical to the SRB1 may be included.

[0191] 4. SRB Configuration Through an LTE BS and an NR BS

[0192] The NR may include radio communication features different from the LTE, and an LTE BS may not understand an RRC message generated by the NR BS.

[0193] The NR BS may directly transmit to a UE an NR RRC message including one or more control functions among an NR cell/cell group/transmission point/transmission point group/transmission and/or reception point/transmission and/or reception point group/TRP/antenna/antenna group/beam addition/modification/release/management, NR measurement, NR measurement reporting, NR resource allocation, NR radio bearer addition/correction/release, NR radio resource configuration, and NR mobility control.

[0194] However, the NR may be constructed even at a high frequency band (e.g., a high frequency of 6 GHz or more). In this case, fast SINR drops may occur according to link blockage of a high frequency band and high transmission loss, and a problem may be caused when an NR RRC is transmitted. To solve this problem, an NR RRC message should be transmitted by using all of interfaces between an NR BS and a UE and interfaces between an LTE BS and the UE.

[0195] On the contrary, it may be preferable to transmitting some UL or DL RRC messages first through the LTE BS for reliability.

[0196] FIG. **6** is a diagram illustrating a dual connectivity SRS configuration according to further another embodiment of the present disclosure.

[0197] Referring to FIG. **6**, for example, when LTE-NR dual connectivity (or when configuring an NR addition radio resource) is configured in a UE **610**, an LTE BS **600** may configure an SRB (e.g., SRB1 type) capable of the UE **610** using all of the LTE BS **600** and an NR BS **650**. The SRB capable of using all of the LTE BS **600** and the NR BS **650**, that is, a signaling radio bearer configured such that the LTE BS can use all of the LTE BS and the NR BS is, for convenience of description, hereinafter, referred to as an LTE-splitSRB1. The establishment of LTE-splitSRB1 should be configured through an RRC reconfiguration configured through an RRC reconfiguration message configuring (reconfiguring) LTE-NR dual connectivity (configuring an NR addition radio resource).

[0198] It is required to perform integrity protection and ciphering for all RRC messages over the LTE-splitSRB1.

[0199] To do this, for the LTE-splitSRB1, it is required to always activate security from the start. The NR BS **600** is required not to establish this bearer before activating security. The LTE BS **600** is required not to request NR BS addition before activating security. The NR BS **650** may establish an NR configuration for the LTE-splitSRB1 according to indication information included in an NR BS addition request of the LTE BS **600**.

[0200] For example, when requesting NR BS addition, the LTE BS **600** transmits information for indicating to configure the LTE-splitSRB1 to the NR BS **650**. The NR BS **650** transmits information for configuring an NR part of the LTE-splitSRB1 (for example, one or more of logaicalchannelconfig, logicalchannelldentity and rlcconfig) to a UE **610** through the LTE BS **600**. As another example, the NR BS **650** may indicate information for identifying a configuration of the LTE-splitSRB1 to the LTE BS **600**. As described above, the LTE BS **600** may not understand an NR RRC container/NR RRC IEs of the NR BS **650**. Accordingly, the NR BS **650** may contain indication information for identifying an LTE-splitSRB1 configuration to the LTE BS **600** in a signaling message over interfaces between the NR BS **650** and the LTE BS **600**. When receiving information for indicating to configure the LTE-splitSRB1, the LTE BS **600** may indicate information for configuring an LTE part of the LTE-splitSRB1 to the UE **610**. The LTE BS **600** should preferentially process the LTE-SRB1 over a DRB. For example, a specific logical channel identification information (logicalchannelldentity) value may be designated to the LTE-splitSRB1. It can be defined that the UE **610** should preferentially process a logical channel designated as the LTE-splitSRB1 over a DRB. As another example, a logical channel identification information (logicalchannelldentity) value (for example, 1) identical to the SRB1 may be designated to the LTE-splitSRB1, or which may include SRB1 or SRB2.

[0201] The NR BS **650** should preferentially process the LTE-splitSRB1 over a DRB. For example, a specific logical channel identification information (logicalchannelldentity) value may be designated to the LTE-splitSRB1. The UE **610** should preferentially process a logical channel designated as the LTE-splitSRB1 over a DRB. As another example, a logical channel identification information (logicalchannelldentity) value (for example, 1) identical to the SRB1 may be designated to the LTE-splitSRB1, or which may be comprised of SRB1 or SRB2. As another example, information for indicating to process with a priority identical to the SRB1 may be indicated to the LTE-splitSRB1. As another example, information for indicating that this is a signaling bearer is may be indicated to the LTE-splitSRB1. As another example, a SRB identification information (SRB-identity) value (for example, 1) identical to the SRB1 may be designated to the LTE-splitSRB1. As another example, a logical channel configuration (e.g., priority(1 or 2), prioritisedBitRate(infinite)) value identical or similar to the SRB1 may be designated to the LTE-splitSRB1. As another example, the LTE-splitSRB1 may be processed along with the SRB1, and therefore a separate configuration may not be necessary. As another example, logical channel identification information identical to the SRB1 is included, but information for the UE identifying an entity for the LTE-split SRB1 may be included.

[0202] As another example, logical channel identification information different from the SRB1 is included, but logical channel identification information identical to the SRB1 may be included.

[0203] In this case, the LTE BS **600** may indicate to the UE information for indicating a route of RRC signaling message in a PDCP entity as the LTE BS **600** and the NR BS **650** (or the LTE BS **600** and the NR BS **650** and two BSs).

[0204] Hereinbefore, methods for configuring an SRB when a UE configures dual connectivity using the LTE BS and the NR BS according to embodiments have been described. Furthermore, methods for receiving radio resource configuration information for a UE configuring dual connectivity and methods for processing configuration failure or configuration success when a radio resource is configured by using radio resource configuration information according to embodiments have been described.

[0205] As discussed above, according to embodiments of the present disclosure, radio resource control signaling may be provided for LTE-NR dual connectivity operation supporting tight interworking between the LTE and the NR. In

addition, according to embodiments of the present disclosure, an effective radio connection failure process may be effectively performed in a signaling process between an LTE BS and an NR BS and/or between a UE and any of the LTE BS and the NR BS.

[0206] Hereinafter, configurations of a UE and a BS capable of performing a part or all of the embodiments described with reference to FIGS. **1** to **6** will be discussed with reference to the drawings.

[0207] FIG. **7** is a block diagram illustrating a UE according to some embodiments of the present disclosure.

[0208] Referring to FIG. **7**, a UE **700** configuring dual connectivity may include a controller **710** adding and configuring a secondary BS signaling radio bearer (SRB), a receiver **730** configured to receive a radio resource control (RRC) message including radio resource configuration information on a secondary BS or a secondary cell group through the secondary BS SRB, and a transmitter **720** configured to transmit a failure information message to a master BS in case the UE is unable to comply with the radio resource configuration information included the RRC message.

[0209] For example, the controller **710** may add and configure a secondary BS SRB in the UE. As described above, the secondary BS denotes a NR BS. The master BS and the secondary BS are BSs using radio access technologies different from each other, and the master BS may be an eNB and the secondary BS may be a gNB. Meanwhile, the addition of a secondary BS SRB may be determined by the secondary BS. That is, the secondary BS may determine whether to add a secondary BS SRB to the UE.

[0210] When a master BS performs a secondary BS addition procedure, the controller **710** may configure a secondary BS SRB. In addition, the controller **710** configures a secondary BS radio resource using a secondary BS SRB needed for performing embodiments described above, and controls overall operations of the UE **700** according to whether radio resource configuration is successful.

[0211] For example, the receiver **730** may receive radio resource configuration information on the secondary BS through the additionally configured secondary BS SRB. As another example, the receiver **730** may receive radio resource configuration information on the secondary cell group through the secondary BS SRB. The radio resource configuration information on the secondary BS or the secondary cell group may be received being included in an RRC message.

[0212] Here, the secondary cell group (SCG) denotes one or more cells associated with the secondary BS, and one or more cells associated with the master BS may referred to as a master cell group. That is, when configuring the dual connectivity, the UE may use one cell of each BE or a plurality of cells controlled by each cell.

[0213] Meanwhile, the controller **710** may comply with, in the UE, a secondary BS or a secondary cell group by using the received radio resource configuration information. It may not be possible to configure dual connectivity by using the received radio resource configuration information due to any reason. In this case, the transmitter **720** may transmit a failure information message to the master BS, and therefore may inform it of dual connectivity configuration failure of the UE.

[0214] In addition, in case the UE is unable to comply with the radio resource configuration included in an RRC message and therefore fails to the secondary BS radio resource configuration, the radio resource on the secondary BS or the secondary cell group may be suspended. For example, the radio resource on the secondary BS or the secondary cell group, which is to be suspended, may be at least one of a secondary cell group data radio bearer (DRB), a secondary cell group SRB, a part of a secondary cell group of a split DRB, and a part of a secondary cell group of a split SRB.

[0215] In addition, the failure information message transmitted to the master BS may include cause information on the secondary BS radio resource configuration failure.

[0216] In this case, the secondary BS may identify this by receiving information on the secondary BS radio resource configuration failure from the master BS.

[0217] Meanwhile, if the UE successfully complies with the received radio resource configuration information, and the radio resource configuration is performed, the transmitter **720** may transmit confirmation information on radio resource configuration success to the secondary BS through the secondary BS SRB.

[0218] In addition, the receiver **730** is configured to receive DL control information and data, messages from the BS through a corresponding channel. The transmitter **720** is configured to transmit UL control information and data, messages to the BS through a corresponding channel.

[0219] FIG. **8** is a block diagram illustrating a BS according to some embodiments of the present disclosure.

[0220] Referring to FIG. **8**, a secondary BS controlling dual connectivity of a UE includes a controller **810** configured to determine to add a secondary BS signaling radio bearer (SRB) to a UE, a transmitter **820** configured to transmit a radio resource control (RRC) message including radio resource configuration information on a secondary BS or a secondary cell group to the UE through the secondary BS SRB, and a receiver **830** configured to receive a response message for a radio resource configuration through the secondary BS SRB if the UE successfully complies with the radio resource on the secondary BS. In this case, the UE may configure dual connectivity by using the master BS and the secondary BS.

[0221] As described above, the secondary BS denotes a NR BS. Meanwhile, the addition of the secondary BS SRB may be determined by the secondary BS. That is, the controller **810** may determine whether to add a secondary BS SRB to the UE. When a master BS performs a secondary BS addition procedure, the UE may add a secondary BS SRB. The master BS and the secondary BS area BSs using radio access technologies different from each other, and the master BS may be an eNB and the secondary BS may be a gNB.

[0222] Meanwhile, the transmitter **820** may transmit radio resource configuration information on the secondary BS through the additionally configured secondary BS SRB. As another example, the transmitter **820** may transmit radio resource configuration information on the secondary cell group through the secondary BS SRB. The radio resource configuration information on the secondary BS or the secondary cell group may be transmitted being included in an RRC message.

[0223] Here, the secondary cell group (SCG) denotes one or more cells associated with the secondary BS, and one or more cells associated with the master BS may referred to as a master cell group. That is, when configuring the dual

connectivity, the UE may use one cell of each BE or a plurality of cells controlled by each cell.

[0224] It may not be possible to configure dual connectivity by using the received radio resource configuration information due to any reason. In this case, the UE may transmit a failure information message to the master BS, and therefore may inform it of dual connectivity configuration failure of the UE. The failure information message transmitted to the master BS may include cause information on the secondary BS radio resource configuration failure. In this case, the receiver **830** may identify this by receiving information on the secondary BS radio resource configuration failure from the master BS.

[0225] In addition, in case the UE is unable to comply with the radio resource configuration included in an RRC message and therefore fails to the secondary BS radio resource configuration, the radio resource on the secondary BS or the secondary cell group may be suspended. For example, the radio resource on the secondary BS or the secondary cell group, which is to be suspended, may be at least one of a secondary cell group data radio bearer (DRB), a secondary cell group SRB, a part of a secondary cell group of a split DRB, and a part of a secondary cell group of a split SRB. Through operations described above, a UE can configure dual connectivity by using a plurality of BSs that use radio access network technologies different from one another.

[0226] In addition, the controller **810** configures a secondary BS radio resource using a secondary BS SRB needed for performing embodiments described above in a UE, and controls overall operations of a BS **800** for providing radio resource control signaling for LTE-NR dual connectivity operations supporting tight interworking between LTE and NR according to whether the UE successfully complies with radio resource configuration.

[0227] In addition, the transmitter **820** and the receiver **830** are configured to transmit or receive signals, messages, data required to perform embodiments described above to or from the UE and a master BS.

[0228] The standardized specifications or standard documents related to the embodiments described above constitute a part of the present disclosure. Accordingly, it should be construed that the incorporation of the content of the standardized specifications and part of the standard documents into the detailed description and claims is included within the scope of the present disclosure.

[0229] Although a preferred embodiment of the present disclosure has been described for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims. Therefore, exemplary aspects of the present disclosure have not been described for limiting purposes, but to describe the embodiments, the therefore, the scope of the present disclosure shall not be limited to such embodiments. The various embodiments described above can be combined to provide further embodiments. These and other changes can be made to the embodiments in light of the above-detailed description. In general, in the following claims, the terms used should not be construed to limit the claims to the specific embodiments disclosed in the specification and the claims, but should be construed to include all possible embodiments along with the full scope of equivalents to which such claims are entitled. Accordingly, the claims are not limited by the disclosure.

CROSS-REFERENCE TO RELATED APPLICATION

[0230] If applicable, this application claims priority under 35 U.S.C § 119(a) of Patent Application No. 10-2016-0058157, filed on May 12, 2016, Patent Application No. 10-2016-0083270, filed on Jul. 1, 2016, and Patent Application No. 10-2017-0057549, filed on May 8, 2017 in Korea, the entire contents of which are incorporated herein by reference. In addition, this non-provisional application claims priorities in countries other than the U.S. for the same reason based on the Korean Patent Applications, the entire contents of which are hereby incorporated by reference.

1. A method of a user equipment for configuring dual connectivity, the method comprising:

adding and configuring a secondary base station signaling radio bearer (SRB);

receiving a radio resource control (RRC) message including radio resource configuration information on a secondary base station or a secondary cell group through the secondary base station SRB; and

transmitting a failure information message to a master base station in case the user equipment is unable to comply with the radio resource configuration information included in the RRC message.

2. The method according to claim **1**, wherein the master base station and the secondary base station are base stations using radio access technologies different from each other.

3. The method according to claim **1**, wherein the addition of the secondary base station SRB is determined by the secondary base station.

4. The method according to claim **1**, wherein the addition of the secondary base station SRB is configured when the master base station performs a secondary base station addition procedure.

5. The method according to claim **1**, wherein, in case the user equipment is unable to comply with the radio resource configuration information included in the RRC message and therefore fails to a secondary BS radio resource configuration, a radio resource on the secondary base station or the secondary cell group is suspended.

6. The method according to claim **5**, wherein the radio resource on the secondary base station or the secondary cell group includes at least one of a secondary cell group data radio bearer (DRB), a secondary cell group SRB, a part of a secondary cell group of a split DRB, and a part of a secondary cell group of a split SRB.

7. The method according to claim **1**, wherein the failure information message includes cause information on the secondary base station radio resource configuration failure.

8. A method of a secondary base station for controlling dual connectivity of a user equipment, the method comprising:

determining to add a secondary base station signaling radio bearer (SRB) to the user equipment;

transmitting a radio resource control (RRC) message including radio resource configuration information on a secondary base station or a secondary cell group to the user equipment through the secondary base station SRB; and

receiving a response message for a radio resource configuration from the user equipment through the secondary BS SRB if the UE successfully complies with a radio resource on the secondary base station,

wherein the user equipment configures dual connectivity by using a master base station and the secondary base station.

9. The method according to claim **8**, wherein the master base station and the secondary base station are base stations using radio access technologies different from each other.

10. The method according to claim **8**, wherein, in case the user equipment is unable to comply with the radio resource configuration information included in the RRC message, the user equipment is configured to transmit a failure information message to the master base station.

11. A user equipment for configuring dual connectivity, the user equipment comprising:

a controller configured to add and configure a secondary base station signaling radio bearer (SRB);

a receiver configured to receive a radio resource control (RRC) message including radio resource configuration information on a secondary base station or a secondary cell group through the secondary base station SRB; and

a transmitter configured to transmit a failure information message to a master base station in case the user equipment is unable to comply with the radio resource configuration information included in the RRC message.

12. The user equipment according to claim **11**, wherein the master base station and the secondary base station are base stations using radio access technologies different from each other.

13. The user equipment according to claim **11**, wherein the addition of the secondary base station SRB is determined by the secondary base station.

14. The user equipment according to claim **11**, wherein the addition of the secondary base station SRB is configured when the master base station performs a secondary base station addition procedure.

15. The user equipment according to claim **11**, wherein, in case the user equipment is unable to comply with the radio resource configuration information included in the RRC message and fails to a secondary BS radio resource configuration, a radio resource on the secondary base station or the secondary cell group is suspended.

16. The user equipment according to claim **15**, wherein the radio resource on the secondary base station or the secondary cell group includes at least one of a secondary cell group data radio bearer (DRB), a secondary cell group SRB, a part of a secondary cell group of a split DRB, and a part of a secondary cell group of a split SRB.

17. The user equipment according to claim **11**, wherein the failure information message includes cause information on the secondary base station radio resource configuration failure.

* * * * *

Bibliographic Data

Application No: 16/637,693

Foreign Priority claimed: (•) Yes ( ) No

35 USC 119 (a-d) conditions met: [✓] Yes [ ] No [ ] Met After Allowance

Verified and Acknowledged: /GARY LAFONTANT/ Examiner's Signature [ ] Initials

Title: USER EQUIPMENT, BASE STATION, AND RELATED METHODS

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CONTINUING DATA

This application is a 371 of PCT/CN2018/099379 08/08/2018

FOREIGN APPLICATIONS

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(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	XIAO, Fangying
Art Unit	
Examiner Name	
Attorney Docket Number	US80118

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	
	Filing Date	
	First Named Inventor	XIAO, Fangying
	Art Unit	
	Examiner Name	
	Attorney Docket Number	US80118

	1	NOKIA, ALCATEL-LUCENT SHANGHAI BELL: "Further considerations for SCG SRB and RLF handling", R2-1706857, 3GPP TSG-RAN WG2 NR Adhoc #2, Qingdao, China, 27 - 29 June 2017
	2	NTT DOCOMO: "New SID Proposal: Study on New Radio Access Technology", RP-160671, 3GPP TSG RAN Meeting #71, Göteborg, Sweden, 7.-10. March, 2016

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EXAMINER SIGNATURE

Examiner Signature	/GARY LAFONTANT/	Date Considered	03/26/2021

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(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	XIAO, Fangying
Art Unit	
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Attorney Docket Number	US80118

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That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/ Kyoko C. Makino /	Date (YYYY-MM-DD)	2020-02-07
Name/Print	Kyoko C. Makino	Registration Number	72,200

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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
		(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND SAME Failure AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:36
		(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND AND Failure @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:34
S1	26,335	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:09
S2	1,884	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:29
S3	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:31
S5	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:33
S6	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:34

		uplink AND Failure AND @ad<"20170810"				
S7	440	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:34
S8	343	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:35
S9	108	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND Failure AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:36
S10	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink SAME Failure AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:37
S11	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:49
S12	7	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/02/17 13:50
S13	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2021/03/18 20:12
S14	17	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (SCG OR	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO;	OR	ON	2021/03/19 00:27

		(Secondary ADJ2 Cell ADJ2 Group)) NEAR2 (Fail$3 OR fault)) AND @ad<"20170810"	DERWENT; IBM_TDB			

EAST Search History (Interference)

<This search history is empty>

3/26/2021 4:04:13 PM
C:\Users\glafontant\Documents\EAST\Workspaces\16_637693.wsp

To: eoa-proce@scienbizip.com,eoa-cbd@scienbizip.com,eoa-procc@scienbizippc.com
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 145688

Apr 01, 2021 03:53:38 AM

Dear PAIR Customer:

SBPJ/ScienBiziP, P.C.
550 South Hope Street
Suite 2825
Los Angeles, CA 90071
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 145688 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

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Application	Document	Mailroom Date	Attorney Docket No.
16637693	CTNF	04/01/2021	US80118
	892	04/01/2021	US80118
	1449	04/01/2021	US80118

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SBPJ/ScienBiziP, P.C.
550 South Hope Street
Suite 2825
Los Angeles, CA 90071

Courtesy Reminder for
Application Serial No: 16/637,693

Attorney Docket No: US80118
Customer Number: 145688
Date of Electronic Notification: 04/01/2021

This is a courtesy reminder that new correspondence is available for this application. If you have not done so already, please review the correspondence. The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

An email notification regarding the correspondence was sent to the following email address(es) associated with your customer number:

eoa-proce@scienbizip.com
eoa-cbd@scienbizip.com
eoa-procc@scienbizippc.com

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Doc Code: PA..
Document Description: Power of Attorney

PTO/AIA/82A (07-13)
Approved for use through 03/31/2021. OMB 0651-0035
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NOTE: This form is to be submitted with the Power of Attorney by Applicant form (PTO/AIA/82B) to identify the application to which the Power of Attorney is directed, in accordance with 37 CFR 1.5, unless the application number and filing date are identified in the Power of Attorney by Applicant form. If neither form PTO/AIA/82A nor form PTO/AIA82B identifies the application to which the Power of Attorney is directed, the Power of Attorney will not be recognized in the application.

Application Number	16/637,693
Filing Date	February 7, 2020
First Named Inventor	Fangying XIAO
Title	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
Art Unit	2646
Examiner Name	Gary LAFONTANT
Attorney Docket Number	15521.0018-00000

SIGNATURE of Applicant or Patent Practitioner

Signature	/Aaron J. Capron/ Reg. No. 56,170 for	Date (Optional)	
Name	Houtan Khalili Esfahani	Registration Number	41,893
Title (if Applicant is a juristic entity)			
Applicant Name (if Applicant is a juristic entity)			

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ *Total of 2 forms are submitted.

This collection of information is required by 37 CFR 1.131, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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Doc Code: PA..
Document Description: Power of Attorney

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POWER OF ATTORNEY BY APPLICANT

I hereby revoke all previous powers of attorney given in the application identified in either the attached transmittal letter or the boxes below.

Application Number	Filing Date

(Note: The boxes above may be left blank if information is provided on form PTO/AIA/82A.)

☑ I hereby appoint the Patent Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above: 22852

OR

☐ I hereby appoint Practitioner(s) named in the attached list (form PTO/AIA/82C) as my/our attorney(s) or agent(s), and to transact all business in the United States Patent and Trademark Office connected therewith for the patent application referenced in the attached transmittal letter (form PTO/AIA/82A) or identified above. (Note: Complete form PTO/AIA/82C.)

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OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

FG Innovation Company Limited

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature	Chie Ming Chou	Date (Optional)	2020/8/20
Name	Chie Ming CHOU		
Title	CEO		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 2 forms are submitted.

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Document Description: Power of Attorney

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OR

☐ Firm or Individual Name					
Address					
City		State		Zip	
Country					
Telephone		Email			

I am the Applicant (if the Applicant is a juristic entity, list the Applicant name in the box):

Sharp Kabushiki Kaisha

☐ Inventor or Joint Inventor (title not required below)

☐ Legal Representative of a Deceased or Legally Incapacitated Inventor (title not required below)

☑ Assignee or Person to Whom the Inventor is Under an Obligation to Assign (provide signer's title if applicant is a juristic entity)

☐ Person Who Otherwise Shows Sufficient Proprietary Interest (e.g., a petition under 37 CFR 1.46(b)(2) was granted in the application or is concurrently being filed with this document) (provide signer's title if applicant is a juristic entity)

SIGNATURE of Applicant for Patent

The undersigned (whose title is supplied below) is authorized to act on behalf of the applicant (e.g., where the applicant is a juristic entity).

Signature		Date (Optional)	
Name	Mototaka TANEYA		
Title	Executive Managing Officer, BU President Corporate Research & Development BU, Sharp Kabushiki Kaisha		

NOTE: Signature - This form must be signed by the applicant in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. If more than one applicant, use multiple forms.

☑ Total of 2 forms are submitted.

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PATENT
Attorney Docket No. 15521.0018-00000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	
Fangying XIAO et al.	)	Group Art Unit: 2646
	)	
Application No.: 16/637,693	)	Examiner: Gary LAFONTANT
	)	
Filed: February 7, 2020	)	
	)	Confirmation No.: 2923
For: USER EQUIPMENT, BASE STATION, AND RELATED METHODS	)	
	)	
	)	***VIA EFS-WEB***

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97(c)

Pursuant to 37 C.F.R. §§ 1.56 and 1.97(c), Applicant brings to the attention of the Examiner the documents on the attached listing. This Information Disclosure Statement is being filed after the events recited in Section 1.97(b) but, to the undersigned's knowledge, before the mailing date of either a Final action, *Quayle* action, or a Notice of Allowance. Under the provisions of 37 C.F.R. § 1.97(c), this Information Disclosure Statement is accompanied by a fee of $260.00 as specified by Section 1.17(p).

Copies of the listed foreign and non-patent literature documents are included with this submission. Copies of the U.S. patents and U.S. published patent applications are not included pursuant to 37 C.F.R. § 1.98(a)(2)(ii).

In lieu of a concise explanation of relevance of the cited non-English-language documents, Applicant provides an English-language abstract and/or machine translation

and/or cites a corresponding English-language patent document, as indicated on the attached Form SB/08.

Applicant notes that the machine translation process for such references(s) may have included Optical Character Recognition (OCR) processing. Portions not captured by machine translation or OCR and remaining non-English words may have been manually translated. M.P.E.P. § 609.04(III) states that "[t]here is no requirement for [such] translation[s] to be verified." Accordingly, Applicant has not verified the accuracy of any such abstract, machine translation, and/or OCR processing.

Applicant respectfully requests that the Examiner consider the listed documents and indicate that they were considered by making appropriate notations on the attached Form.

This submission does not represent that a search has been made or that no better art exists and does not constitute an admission that each or all of the listed documents are material or constitute "prior art." If the Examiner applies any of the documents as prior art against any claim in the application and Applicant determines that the cited documents do not constitute "prior art" under United States law, Applicant reserves the right to present to the U.S. Patent and Trademark Office the relevant facts and law regarding the appropriate status of such documents.

Applicant further reserves the right to take appropriate action to establish the patentability of the disclosed invention over the listed documents, should one or more of the documents be applied against the claims of the present application.

If there is any fee due in connection with the filing of this Statement, please charge the fee to Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

Dated: June 17, 2021

By: /Aaron J. Capron/ Reg. No. 56,170 for
Houtan Khalili Esfahani
Reg. No. 41,893
(202) 408-4000

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Complete if Known	
				Application Number	16/637,693
				Filing Date	February 7, 2020
				First Named Inventor	Fangying XIAO
				Art Unit	2646
				Examiner Name	Gary Lafontant
Sheet	1	of	1	Attorney Docket Number	15521.0018-00000

U.S. PATENTS					
Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Issue or Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-			

U.S. PUBLISHED PATENT APPLICATIONS					
Examiner Initials*	Cite No.[3]	Document Number Number-Kind Code[4] *(if known)*	Issue or Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2016/0192249 A1	06-30-2016	WU	
		US-2016/0212753 A1	07-21-2016	WU	
		US-2016/0302256 A1	10-13-2016	SUSITAIVAL	

Note: Submission of copies of U.S. Patents and published U.S. Patent Applications is not required.

FOREIGN PATENT DOCUMENTS						
Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[5] Number[6] Kind Code[7] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	Translation[8]
	1	CN 105684496 A	06-15-2016	LG ELECTRONICS INC.		Abstract
	2	WO 2016/064334 A1	04-28-2016	TELEFONAKTIEBOLAGET L M ERICSSON		

NONPATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	Translation[6]
	3	International Search Report and Written Opinion issued in related International Application No. PCT/CN2018/099379, mailed October 29, 2018 (6 pgs.).	
	4	The extended European search report pursuant to Rule 62 EPC, the supplementary European search report (Art. 153(7) EPC) and the European search opinion issued in related EP Application No. 18844831.0, mailed April 1, 2021 (8 pgs.).	
	5	ZTE, "Configuration of SCG SRB and Split&Duplicated SRB," 3GPP TSG-RAN WG3#Ad-hoc R3-172053, June 26-29, 2017 (7 pgs.)	

Examiner Signature		Date Considered	

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Espacenet

Bibliographic data: CN105684496 (A) — 2016-06-15

METHOD FOR REPORTING RADIO LINK PROBLEM AND DEVICE THEREFOR

Inventor(s): LEE SUN-YOUNG; YI SEUNG-JUNE; PARK SUNG-JUN ± (李善暎, ; 李承俊, ; 朴成埈)

Applicant(s): LG ELECTRONICS INC ± (LG电子株式会社)

Classification: - international: *H04B7/26; H04W24/10*
- cooperative: H04L1/187 (EP, US); H04W24/10 (EP, KR, US); H04W56/00 (EP, KR, US); H04W56/0005 (EP, US); H04W72/0413 (US); H04W74/0833 (KR); H04W76/18 (EP, US)

Application number: CN20148058123 20140918 Global Dossier

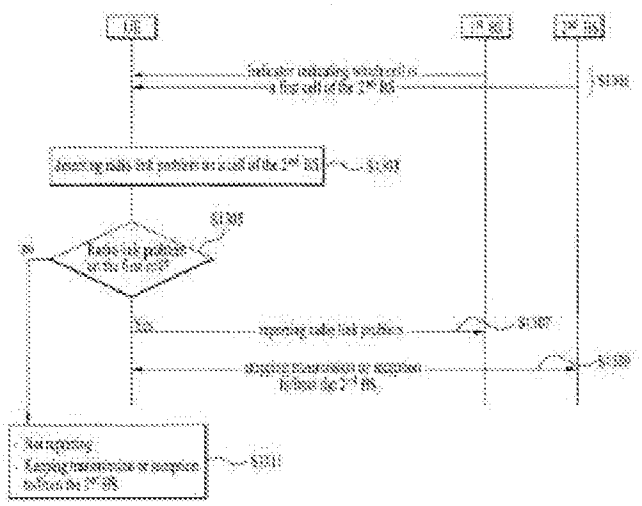
Priority number(s): US201361894902P 20131023 ; WO2014KR08699 20140918

Also published as: CN105684496 (B) CN110113772 (A) KR20160073962 (A) US10575204 (B2) US10687239 (B2) more

Abstract of CN105684496 (A)

The present invention relates to a wireless communication system. More specifically, the present invention relates to a method and a device for reporting an radio link problem in the wireless communication system, the method comprising: receiving an indicator indicating which cell is a first cell of the second BS from either the first BS or the second BS; detecting a radio link problem on a cell belonging to the second BS; and reporting the radio link problem of the second BS to the first BS if the cell, on which the radio link problem is detected, is indicated as the first cell by the indicator.

FIG. 13



(19)中华人民共和国国家知识产权局

(12)发明专利申请

(10)申请公布号 CN 105684496 A
(43)申请公布日 2016.06.15

(21)申请号 201480058123.9

(22)申请日 2014.09.18

(30)优先权数据
61/894,902 2013.10.23 US

(85)PCT国际申请进入国家阶段日
2016.04.22

(86)PCT国际申请的申请数据
PCT/KR2014/008699 2014.09.18

(87)PCT国际申请的公布数据
WO2015/060543 EN 2015.04.30

(71)申请人 LG电子株式会社
地址 韩国首尔

(72)发明人 李善暎 李承俊 朴成埈

(74)专利代理机构 北京三友知识产权代理有限公司 11127
代理人 李辉 刘久亮

(51)Int.Cl.
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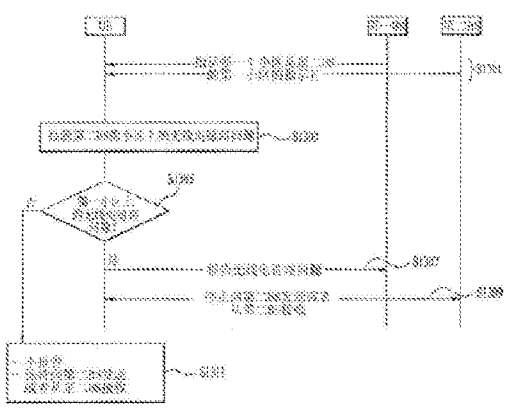
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(54)发明名称

用于报告无线电链路问题的方法及其装置

(57)摘要

本发明涉及无线通信系统。更具体地，本发明涉及一种用于在无线通信系统中报告无线电链路问题的方法和装置，该方法包括以下步骤：从第一BS或第二BS接收指示哪一个小区是所述第二BS的第一小区的指示符；在属于所述第二BS的小区上检测无线电链路问题；以及如果被检测到所述无线电链路问题的小区由所述指示符指示为所述第一小区，则将所述第二BS的所述无线电链路问题报告给所述第一BS。



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1.一种用于在包括第一基站BS和第二BS的无线通信系统中操作的用户设备UE的方法，该方法包括以下步骤：

从所述第一BS或所述第二BS接收指示哪一个小区是所述第二BS的第一小区的指示符；

在属于所述第二BS的小区上检测无线电链路问题；以及

如果被检测到所述无线电链路问题的小区由所述指示符指示为所述第一小区，则将所检测到的所述第二BS的无线电链路问题报告给所述第一BS。

2.根据权利要求1所述的方法，其中，所述第一小区总是在所述第二BS中被激活。

3.根据权利要求1所述的方法，其中，所述第一小区被允许执行基于竞争的随机接入过程。

4.根据权利要求1所述的方法，其中，所述第一小区被配置有物理上行链路控制信道PUCCH。

5.根据权利要求1所述的方法，其中，物理层中的所述无线电链路问题是小区不同步达配置的持续时间。

6.根据权利要求1所述的方法，其中，数据被发送到小区的MAC层中的所述无线电链路问题是已经达到所述小区上的随机接入前导码重新发送的最大数目。

7.根据权利要求1所述的方法，该方法还包括以下步骤：

如果小区被指示为所述第一小区，则停止向所述第二BS的所有上行链路UL发送。

8.根据权利要求1所述的方法，其中，所述报告的步骤包括以下步骤：如果小区被指示为所述第一小区，则报告所述第二BS的所述无线电链路问题的原因。

9.根据权利要求1所述的方法，其中，如果小区不是所述第一小区，则所述第二BS的所述无线电链路问题不被报告给所述第一BS。

10.根据权利要求1所述的方法，该方法还包括以下步骤：

如果小区不是所述第一小区，则保持向所述第二BS的上行链路UL发送。

11.一种在无线通信系统中操作的用户设备UE，该UE包括：

射频RF模块；以及

处理器，该处理器被配置为控制所述RF模块，

其中，所述处理器被配置为从所述第一BS或所述第二BS接收指示哪一个小区是所述第二BS的第一小区的指示符，在属于所述第二BS的小区上检测无线电链路问题，并且如果被检测到所述无线电链路问题的小区由所述指示符指示为所述第一小区，则将所检测到的所述第二BS的无线电链路问题报告给所述第一BS。

12.根据权利要求11所述的UE，其中，所述第一小区总是在所述第二BS中被激活。

13.根据权利要求11所述的UE，其中，所述第一小区被允许执行基于竞争的随机接入过程。

14.根据权利要求11所述的UE，其中，所述第一小区被配置有物理上行链路控制信道PUCCH。

15.根据权利要求11所述的UE，其中，物理层中的所述无线电链路问题是小区不同步达配置的持续时间。

16.根据权利要求11所述的UE，其中，数据被发送到小区的MAC层中的所述无线电链路问题是已经达到所述小区上的随机接入前导码重新发送的最大数目。

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17.根据权利要求11所述的UE，其中，如果小区被指示为所述第一小区，则所述处理器被配置为停止向所述第二BS的所有上行链路UL发送。

18.根据权利要求1所述的方法，其中，如果小区被指示为所述第一小区，则所述UE报告所述第二BS的所述无线电链路问题的原因。

19.根据权利要求1所述的方法，其中，如果小区不是所述第一小区，则所述处理器被配置为不报告所述第二BS的所述无线电链路问题。

20.根据权利要求1所述的方法，其中，如果小区不是所述第一小区，则所述处理器被配置为保持向所述第二BS的上行链路UL发送。

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用于报告无线电链路问题的方法及其装置

技术领域

[0001] 本发明涉及无线通信系统，并且更具体地，涉及一种用于报告无线电链路问题的方法及其装置。

背景技术

[0002] 作为本发明适用于的移动通信系统的示例，简要地描述了第三代合作伙伴计划长期演进(在下文中，被称为LTE)通信系统。

[0003] 图1是示意性地例示了作为示例性无线电通信系统的E-UMTS的网络结构的图。演进型通用移动电信系统(E-UMTS)是常规的通用移动电信系统(UMTS)的高级版本，并且当前正在3GPP中进行其基本标准化。E-UMTS可以被通常称为长期演进(LTE)系统。对于UMTS和E-UMTS的技术规范的细节，能够参考“3rd Generation Partnership Project;Technical Specification Group Radio Access Network”的版本7和版本8。

[0004] 参照图1，E-UMTS包括用户设备(UE)、eNode B(eNB)和接入网关(AG)，所述AG位于网络(E-UTRAN)的端部处并且连接至外部网络。eNB可以同时发送多个数据流，以便于广播服务、多播服务和/或单播服务。

[0005] 每个eNB可以存在一个或更多个小区。小区被设置为在诸如1.25MHz、2.5MHz、5MHz、10MHz、15MHz和20MHz这样的带宽中的一个中操作，并且在宽带中向多个UE提供下行链路(DL)或上行链路(UL)发送服务。可以将不同的小区设置为提供不同的带宽。eNB控制到多个UE的数据发送或者来自多个UE的数据接收。eNB向对应UE发送DL数据的DL调度信息，以便向UE通知假定要发送DL数据的时域/频域、编码、数据大小以及混合自动重传请求(HARQ)相关信息。另外，eNB向对应UE发送UL数据的UL调度信息，以便向UE通知可以由UE使用的时域/频域、编码、数据大小和HARQ相关信息。可以在eNB之间使用用于发送用户业务或控制业务的接口。核心网络(CN)可以包括AG以及用于UE的用户注册的网络节点等。AG基于跟踪区域(TA)来管理UE的移动性。一个TA包括多个小区。

[0006] 尽管无线通信技术已经发展到基于宽带码分多址(WCDMA)的LTE，然而用户和服务提供方的需求和期望在增加。另外，考虑到发展中的其它无线电接入技术，需要新的技术演进以在将来确保高竞争力。需要减少每比特成本、增加可用服务、灵活使用频带、简单结构、开放接口、UE的适当功耗等。

发明内容

[0007] 技术问题

[0008] 被设计来解决所述问题的本发明的目的在于一种用于报告无线电链路问题的方法和装置。由本发明解决的技术问题不限于上述技术问题，并且本领域技术人员可以根据以下描述来理解其它技术问题。

[0009] 技术解决方案

[0010] 能够通过提供一种用于由设备在无线通信系统中操作的方法来实现本发明的目

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的，该方法包括以下步骤：从第一BS或第二BS接收指示哪一个小区是第二BS的第一小区的指示符；在属于所述第二BS的小区上检测无线电链路问题；以及如果被检测到所述无线电链路问题的小区由所述指示符指示为所述第一小区，则将所检测到的所述第二BS的无线电链路问题报告给所述第一BS。

[0011] 在本发明的另一方面中，本文中所提供的是一种在无线通信系统中的设备，该设备包括：射频(RF)模块；以及处理器，该处理器被配置为控制所述RF模块，其中，所述处理器被配置为从所述第一BS或所述第二BS接收指示哪一个小区是所述第二BS的第一小区的指示符，在属于所述第二BS的小区上检测无线电链路问题，并且如果被检测到所述无线电链路问题的小区由所述指示符指示为所述第一小区，则将所检测到的所述第二BS的无线电链路问题报告给所述第一BS。

[0012] 优选地，所述第一小区总是在所述第二BS中被激活。

[0013] 优选地，所述第一小区被允许执行基于竞争的随机接入过程。

[0014] 优选地，所述第一小区被配置有物理上行链路控制信道(PUCCH)。

[0015] 优选地，物理层中的所述无线电链路问题是小区不同步达配置的持续时间。

[0016] 优选地，数据被发送到小区的MAC层中的所述无线电链路问题是已经达到所述小区上的随机接入前导码重新发送的最大数目。

[0017] 优选地，所述方法还包括以下步骤：如果小区被指示为所述第一小区则停止向所述第二BS的所有上行链路(UL)发送。

[0018] 优选地，所述方法还包括以下步骤：如果小区被指示为所述第一小区，则报告所述第二BS的所述无线电链路问题的原因。

[0019] 优选地，如果小区不是所述第一小区，则所述第二BS的所述无线电链路问题不被报告给所述第一BS。

[0020] 优选地，所述方法还包括以下步骤：如果小区不是所述第一小区，则保持向所述第二BS的上行链路(UL)发送。

[0021] 要理解的是，本发明的以上总体描述和以下详细描述二者是示例性和说明性的，并且旨在提供对如要求保护的本发明的进一步说明。

[0022] 有益效果

[0023] 根据本发明，在无线通信系统中报告无线电链路故障。具体地，本发明能够提供关于在双重连接性系统中监测并报告无线电链路故障的解决方案。

[0024] 本领域技术人员将领会的是，由本发明实现的效果不限于已经在上文具体描述的效果，并且根据结合附图进行的以下详细描述，将更清楚地理解本发明的其它优点。

附图说明

[0025] 附图被包括进来以提供对本发明的进一步理解，并且被并入本申请并构成本申请的一部分，附图例示了本发明的实施方式，并且与本说明书一起用来说明本发明的原理。

[0026] 图1是示出了作为无线通信系统的示例的演进型通用移动电信系统(E-UMTS)的网络结构的图；

[0027] 图2A是例示了演进型通用移动电信系统(E-UMTS)的网络结构的框图，并且图2B是描绘了典型E-UTRAN和典型EPC的架构的框图；

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[0028] 图3是示出了基于第三代合作伙伴计划(3GPP)无线电接入网标准的UE与E-UTRAN之间的无线电接口协议的控制平面和用户平面的图；

[0029] 图4是E-UMTS系统中使用的示例物理信道结构的图；

[0030] 图5是针对载波聚合的图；

[0031] 图6是针对主小区组(MCS)与辅小区组(SCG)之间的双重连接性的概念图；

[0032] 图7a是针对双重连接性中涉及的基站的C平面连接性的概念图，并且图7b是针对双重连接性中涉及的基站的U平面连接性的概念图；

[0033] 图8是针对双重连接性的无线电协议架构的概念图；

[0034] 图9是用于执行无线电链路监测(RLM)和无线电链路故障(RLF)的概念图；

[0035] 图10是当从RLC指示已经达到重新发送的最大数目时的RLF的示例；

[0036] 图11是用于执行无线电资源控制(RRC)连接重新建立的概念图；

[0037] 图12是针对双重连接性的无线电协议架构中的一个的概念图；

[0038] 图13是根据本发明的实施方式的用于报告无线电链路问题的概念图；以及

[0039] 图14是根据本发明的实施方式的通信设备的框图。

具体实施方式

[0040] 通用移动通信系统(UMTS)是在基于欧洲系统、全球移动通信系统(GSM)和通用分组无线电服务(GPRS)的宽带码分多址(WCDMA)中操作的第三代(3G)异步移动通信系统。UMTS的长期演进(LTE)由使UMTS标准化了的第三代合作伙伴计划(3GPP)在讨论中。

[0041] 3GPP LTE是用于使得能实现高速分组通信的技术。已经为LTE目标提出了许多方案，包括旨在减少用户和提供方成本、改进服务质量以及扩展并改进覆盖范围和系统容量的方案。3G LTE需要减少每比特成本、增加服务可用性、灵活使用频带、简单结构、开放接口和终端的适当功耗作为高级要求。

[0042] 在下文中，将从本发明的实施方式容易地理解本发明的结构、操作和其它特征，本发明的实施方式的示例被例示在附图中。稍后描述的实施方式是本发明的技术特征被应用于3GPP系统的示例。

[0043] 尽管在本说明书中使用长期演进(LTE)系统和高级LTE(LTE-A)系统来描述本发明的实施方式，然而这些实施方式仅是示例性的。因此，本发明的实施方式适用于与上述限定对应的任何其它通信系统。另外，尽管在本说明书中基于频分双工(FDD)方案对本发明的实施方式进行描述，然而可以容易地修改本发明的实施方式并且将其应用于半双工FDD(H-FDD)方案或时分双工(TDD)方案。

[0044] 图2A是例示了演进型通用移动电信系统(E-UMTS)的网络结构的框图。E-UMTS还可以被称为LTE系统。通信网络被广泛地部署以提供诸如通过IMS和分组数据的语音(VoIP)这样的各种通信服务。

[0045] 如图2A中所例示的，E-UMTS网络包括演进型UMTS陆地无线电接入网络(E-UTRAN)、演进型分组核心(EPC)以及一个或更多个用户设备。E-UTRAN可以包括一个或更多个演进型NodeB(eNodeB)20，并且多个用户设备(UE)10可以位于一个小区中。一个或更多个E-UTRAN移动性管理实体(MME)/系统架构演进(SAE)网关30可以被定位在网络的端部处并且连接至外部网络。

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[0046] 如本文中所使用的，“下行链路”是指从eNodeB 20到UE 10的通信，而“上行链路”是指从UE到eNodeB的通信。UE 10是指由用户携带的通信设备，并且还可以被称为移动站(MS)、用户终端(UT)、订户站(SS)或无线装置。

[0047] 图2B是描绘了典型E-UTRAN和典型EPC的架构的框图。

[0048] 如图2B中所例示的，eNodeB 20向UE 10提供用户平面和控制平面的端点。MME/SAE网关30为UE 10提供会话和移动性管理功能的端点。eNodeB和MME/SAE网关可以经由S1连接。

[0049] eNodeB 20通常是与UE 10进行通信的固定站，并且还可以被称为基站(BS)或接入点。每个小区可以部署一个eNodeB 20。可以在eNodeB 20之间使用用于发送用户业务或控制业务的接口。

[0050] MME提供包括以下的各种功能：至eNodeB 20的NAS信令、NAS信令安全、AS安全控制、针对3GPP接入网络之间的移动性的CN节点间信令、空闲模式UE可达性(包括寻呼重新发送的控制和执行)、跟踪区域列表管理(针对处于空闲模式和激活模式的UE)、PDN GW和服务GW选择、在MME改变情况下针对切换的MME选择、针对切换到2G或3G 3GPP接入网络的SGSN选择、漫游、认证、包括专用承载建立的承载管理功能、对于PWS(其包括ETWS和CMAS)消息发送的支持。SAE网关主机提供包括以下的各种功能：基于每用户的分组过滤(通过例如深度分组检查)、合法拦截、UE IP地址分配、下行链路中的传输级分组标记、UL和DL服务级计费、选通和速率实施、基于APN-AMBR的DL速率实施。为了清楚，MME/SAE网关30将在本文中被简称为“网关”，但是要理解的是，该实体包括MME和SAE网关二者。

[0051] 多个节点可以经由S1接口连接在eNodeB 20与网关30之间。eNodeB 20可以经由X2接口彼此连接，并且邻近的eNodeB可以具有具备X2接口的网状网络结构。

[0052] 如所例示，eNodeB 20可以执行以下功能：选择网关30、在无线电资源控制(RRC)激活期间朝向网关路由、寻呼消息的调度和发送、广播信道(BCCH)信息的调度和发送、在上行链路和下行链路二者中向UE 10动态分配资源、eNodeB测量的配置和提供、无线电承载控制、无线电准入控制(RAC)以及在LTE_ACTIVE状态下的连接移动性控制。在EPC中，并且如以上所指出的，网关30可以执行以下功能：寻呼发起、LTE-IDLE状态管理、用户平面的加密、系统架构演进(SAE)承载控制以及非接入层(NAS)信令的加密和完整性保护。

[0053] EPC包括移动性管理实体(MME)、服务网关(S-GW)和分组数据网络-网关(PDN-GW)。MME具有关于UE的连接和能力的信息，主要用于在管理UE的移动性时使用。S-GW是具有E-UTRAN作为端点的网关，并且PDN-GW是具有分组数据网络(PDN)作为端点的网关。

[0054] 图3是示出了基于3GPP无线电接入网标准的UE与E-UTRAN之间的无线电接口协议的控制平面和用户平面的图。控制平面是指用于发送用于管理UE与E-UTRAN之间的呼叫的控制消息的路径。用户平面是指用于发送在应用层中生成的数据(例如，语音数据或互联网分组数据)的路径。

[0055] 第一层的物理(PHY)层使用物理信道来向更高层提供信息传送服务。PHY层经由传输信道连接至位于更高层上的介质访问控制(MAC)层。经由传输信道在MAC层与PHY层之间传输数据。经由物理信道在发送侧的物理层与接收侧的物理层之间传输数据。物理信道使用时间和频率作为无线电资源。详细地，物理信道在下行链路中使用正交频分多址(OFDMA)方案来调制，而在上行链路中使用单载波频分多址(SC-FDMA)方案来调制。

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[0056] 第二层的MAC层经由逻辑信道向更高层的无线电链路控制(RLC)层提供服务。第二层的RLC层支持可靠的数据传输。RLC层的功能可以由MAC层的功能块来实现。第二层的分组数据汇聚协议(PDCP)层执行报头压缩功能以减少不必要的控制信息,以便于诸如IP版本4(IPv4)分组或IP版本6(IPv6)分组这样的网际协议(IP)分组在具有相对较小的带宽的无线电接口中的高效发送。

[0057] 仅在控制平面中限定位于第三层的底部处的无线电资源控制(RRC)层。RRC层控制与无线电承载(RB)的配置、重新配置和释放有关的逻辑信道、传输信道和物理信道。RB是指第二层提供UE与E-UTRAN之间的数据发送的服务。为此,UE的RRC层和E-UTRAN的RRC层彼此交换RRC消息。

[0058] eNB的一个小区被设置为在诸如1.25MHz、2.5MHz、5MHz、10MHz、15MHz和20MHz这样的带宽中的一个中操作,并且在所述带宽中向多个UE提供下行链路或上行链路发送服务。可以将不同的小区设置为提供不同的带宽。

[0059] 用于从E-UTRAN向UE发送数据的下行链路传输信道包括用于发送系统信息的广播信道(BCH)、用于发送寻呼消息的寻呼信道(PCH)以及用于发送用户业务或控制消息的下行链路共享信道(SCH)。下行链路多播或广播服务的业务或控制消息可以通过下行链路SCH来发送,并且还可以通过单独的下行链路多播信道(MCH)来发送。

[0060] 用于将数据从UE发送到E-UTRAN的上行链路传输信道包括用于发送初始控制消息的随机接入信道(RACH)以及用于发送用户业务或控制消息的上行链路SCH。被限定在传输信道之上并且映射到传输信道的逻辑信道包括广播控制信道(BCCH)、寻呼控制信道(PCCH)、公共控制信道(CCCH)、多播控制信道(MCCH)和多播业务信道(MTCH)。

[0061] 图4是示出了E-UMTS系统中使用的物理信道结构的示例的图。一个物理信道在时间轴上包括多个子帧,而在频率轴上包括多个子载波。这里,一个子帧在时间轴上包括多个符号。一个子帧包括多个资源块,并且一个资源块包括多个符号和多个子载波。另外,每个子帧可以将子帧的特定符号(例如,第一符号)的特定子载波用于物理下行链路控制信道(PDCCH),即,L1/L2控制信道。在图4中,示出了L1/L2控制信息发送区域(PDCCH)和数据区域(PDSCH)。在一个实施方式中,使用了10ms的无线电帧,并且一个无线电帧包括10个子帧。另外,一个子帧包括两个连续的时隙。一个时隙的长度可以是0.5ms。另外,一个子帧包括多个OFDM符号,并且所述多个OFDM符号的一部分(例如,第一符号)可以被用于发送L1/L2控制信息。作为用于发送数据的单位时间的发送时间间隔(TTI)是1ms。

[0062] 基站和UE通常使用作为发送信道的DL-SCH来经由作为物理信道的PDSCH发送/接收除特定控制信号或特定服务数据之外的数据。指示将PDSCH数据发送到哪个UE(一个或多个UE)以及UE如何接收PDSCH数据并对其进行解码的信息在被包含在PDCCH中的状态下发送。

[0063] 例如,在一个实施方式中,特定PDCCH利用无线电网络临时标识(RNTI)"A"进行CRC掩码处理,并且关于数据的信息经由特定子帧使用无线电资源"B"(例如,频率位置)和发送格式信息"C"(例如,发送块大小、调制、编码信息等)来发送。然后,位于小区中的一个或更多个UE使用其RNTI信息来监测PDCCH。另外,具有RNTI"A"的特定UE读取PDCCH,然后接收由B和C在PDCCH信息中指示的PDSCH。

[0064] 图5是针对载波聚合的图。

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[0065] 如下参照图5描述用于支持多个载波的载波聚合技术。如在前面的描述中所提及的，载波聚合技术能够按照通过载波聚合来捆绑在传统的无线通信系统(例如，LTE系统)中限定的带宽单元(例如，20MHz)的最多5个载波(分量载波:CC)的方式支持多达最大100MHz的系统带宽。用于载波聚合的分量载波可以在带宽大小上彼此相同或不同。另外，分量载波中的每一个可以具有不同的频带(或中心频率)。分量载波可以存在于连续的频带上。然而，存在于非连续的频带上的分量载波同样可以被用于载波聚合。在载波聚合技术中，可以对称地或者不对称地分配上行链路和下行链路的带宽大小。

[0066] 用于载波聚合的多个载波(分量载波)可以被分类成主分量载波(PCC)和辅分量载波(SCC)。PCC可以被称作P小区(主小区)，并且SCC可以被称作S小区(辅小区)。主分量载波是由基站用来与用户设备交换业务和控制信令的载波。在这种情况下，控制信令可以包括分量载波的添加、针对主分量载波的设置、上行链路(UL)授权、下行链路(DL)指派等。尽管基站能够使用多个分量载波，然而属于对应基站的用户设备可以被设置为仅具有一个主分量载波。如果用户设备在单载波模式下操作，则使用主分量载波。因此，为了被独立地使用，应该将主分量载波设置为满足针对基站与用户设备之间的数据和控制信令交换的所有要求。

[0067] 此外，辅分量载波可以包括能够根据收发的数据所需的大小来激活或者停用的附加分量载波。可以将辅分量载波设置为仅根据从基站接收的特定命令和规则来使用。为了支持附加带宽，可以将辅分量载波设置为与主分量载波一起使用。通过激活的分量载波，诸如UL授权、DL指派等这样的控制信号能够由用户设备从基站接收。通过激活的分量载波，能够从用户设备向基站发送诸如信道质量指示符(CQI)、预编码矩阵索引(PMI)、秩指示符(RI)、探测基准信号(SRS)等这样的UL中的控制信号。

[0068] 向用户设备的资源分配能够具有一系列主分量载波和多个辅分量载波。在多载波聚合模式下，基于系统负荷(即，静态/动态负荷平衡)、峰值数据速率或服务质量要求，系统能够向DL和/或UL不对称地分配辅分量载波。在使用载波聚合技术时，分量载波的设置可以由基站在RRC连接过程之后提供给用户设备。在这种情况下，RRC连接可能意味着无线电资源是经由SRB基于在用户设备的RRC层与网络之间交换的RRC信令而分配给用户设备的。在完成用户设备与基站之间的RRC连接过程之后，用户设备可以由基站提供有关于主分量载波和辅分量载波的设置信息。关于辅分量载波的设置信息可以包括辅分量载波的添加/删除(或者激活/停用)。因此，为了激活基站与用户设备之间的辅分量载波或者停用先前的辅分量载波，可能有必要执行RRC信令和MAC控制元素的交换。

[0069] 辅分量载波的激活或停用可以由基站基于服务质量(QoS)、载波的负荷条件和其它因素来确定。另外，基站能够使用包含诸如用于UL/DL的指示类型(激活/停用)、辅分量载波列表等这样的信息的控制消息来向用户设备指示辅分量载波设置。

[0070] 图6是针对主小区组(MCS)与辅小区组(SCG)之间的双重连接性(DC)的概念图。

[0071] 双重连接性意味着UE能够同时连接至主eNode-B(MeNB)和辅eNode-B(SeNB)二者。MCG是与MeNB关联的一组服务小区，包括PCell并且可选地包括一个或更多个SCell。另外，SCG是与SeNB关联的一组服务小区，包括特殊SCell并且可选地包括一个或更多个SCell。MeNB是至少终止S1-MME(用于控制平面的S1)的eNB，并且SeNB是正在为UE提供附加无线电资源但不是MeNB的eNB。

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[0072] 利用双重连接性，能够将数据无线电承载(DRB)中的一些卸载到SCG，以在MCG中保持对无线电承载(SRB)或其它DRB进行调度的同时提供高吞吐量以减小切换可能性。MCG由MeNB经由频率f1进行操作，而SCG由SeNB经由频率f2进行操作。频率f1和频率f2可以相等。MeNB与SeNB之间的回程接口(BH)是非理想的(例如，X2接口)，这意味着在回程中存在相当大的延迟，并因此一个节点中的集中式调度是不可能的。

[0073] 图7a示出了针对特定UE的双重连接性中涉及的eNB的C平面(控制平面)连接性：MeNB是经由S1-MME连接至MME的C平面，MeNB和SeNB经由X2-C(X2控制平面)互连。像图7a一样，针对双重连接性的eNB间控制平面信令借助于X2接口信令来执行。朝向MME的控制平面信令借助于S1接口信令来执行。在MeNB与MME之间每个UE仅存在一个S1-MME连接。每个eNB应该能够独立地处理UE，即将PCell提供给一些UE同时将用于SCG的SCell提供给其它UE。针对特定UE的双重连接性中涉及的每个eNB拥有其无线电资源并且主要负责分配其小区的无线电资源，MeNB与SeNB之间的相应协调借助于X2接口信令来执行。

[0074] 图7b示出了针对特定UE的双重连接性中涉及的eNB的U平面连接性。U平面连接性取决于所配置的承载选项：i)针对MCG承载，MeNB是经由S1-U连接至S-GW的U平面，SeNB不参与用户平面数据的传输，ii)针对分割承载，MeNB是经由S1-U连接至S-GW的U平面，并且另外，MeNB和SeNB经由X2-U互连，以及iii)针对SCG承载，SeNB经由S1-U与S-GW直接连接。如果仅配置了MCG承载和分割承载，则在SeNB中不存在S1-U终止。在双重连接性中，需要增强小小区，以便数据从宏小区组卸载到小小区组。因为能够远离宏小区部署小小区，所以多个调度器能够分别位于不同的节点中并且从UE观点看独立地操作。这意味着不同的调度节点将遭遇不同的无线电资源环境，并因此，每个调度节点可以具有不同的调度结果。

[0075] 图8是针对双重连接性的无线电协议架构的概念图。

[0076] 本示例的E-UTRAN能够支持双重连接性操作，由此处于RRC_CONNECTED的多个接收/发送(RX/TX)UE被配置为利用由位于通过X2接口经由非理想回程连接的两个eNB(或基站)中的两个不同的调度器所提供的无线电资源。针对特定UE的双重连接性中涉及的eNB可以假定两个不同的角色：eNB可以要么用作MeNB，要么用作SeNB。在双重连接性中，UE能够连接至一个MeNB和一个SeNB。

[0077] 在双重连接性操作中，特定承载使用的无线电协议架构取决于如何建立承载。存在三个替代方案：MCG承载(801)、分割承载(803)和SCG承载(805)。在图8上描绘了这三个替代方案。SRB(信令无线电承载)始终是MCG承载，并因此仅使用由MeNB提供的无线电资源。MCG承载(801)是仅位于MeNB中以仅在双重连接性中使用MeNB资源的无线电协议。另外，SCG承载(805)是仅位于SeNB中以在双重连接性中使用SeNB资源的无线电协议。

[0078] 具体地，分割承载(803)是位于MeNB和SeNB二者中以在双重连接性中使用MeNB资源和SeNB资源二者的无线电协议，并且分割承载(803)可以是针对一个方向包括一个分组数据汇聚协议(PDCP)实体、两个无线电链路控制(RLC)实体以及两个介质访问控制(MAC)实体的无线电承载。具体地，还能够将双重连接性操作描述为具有被配置为使用由SeNB提供的无线电资源的至少一个承载。

[0079] 图9是用于执行无线电链路监测(RLM)和无线电链路故障(RLF)的概念图。

[0080] 无线电链路监测(RLM)

[0081] UE可以从小区接收小区特定基准信号(S901)。如果UE在载波聚合系统中与多个小

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区连接，则UE可以恭敬地接收多个基准信号。

[0082] UE可以基于小区特定基准信号来监测下行链路链路质量，以便检测以上在图5中提及的PCell的下行链路无线电链路质量(S903)。

[0083] UE可以出于监测PCell的下行链路无线电链路质量的目的而估计下行链路无线电链路质量并且将其与阈值Q_{out}和Q_{in}进行比较(S905)。

[0084] 阈值Q_{out}被限定为不能够可靠地接收下行链路无线电链路的水平，并且可以对应于在表1中指定的发送参数的情况下考虑到PCFICH错误的假想PDCCH发送的10%块出错率。

[0085] [表1]

[0086]

属性	值
DCI 格式	1A
控制 OFDM 符号的数目	2；带宽 ≥ 10 MHz 3；3 MHz ≤ 带宽 ≤ 10 MHz 4；带宽 = 1.4 MHz
聚合级别（CCE）	4；带宽 = 1.4 MHz 8；带宽 ≥ 3 MHz
PDCCH RE 能量与平均 RS RE 能量的比	4 dB；当单个天线端口被 PCell 用于小区特定基准信号发送时。 1 dB；当两个或四个天线端口被 PCell 用于小区特定基准信号发送时。
PCFICH RE 能量与平均 RS RE 能量的比	4 dB；当单个天线端口被 PCell 用于小区特定基准信号发送时。 1 dB；当两个或四个天线端口被 PCell 用于小区特定基准信号发送时。
注释 1：DCI 格式 1A 在 TS 36.212 [21]中的 5.3.3.1.3 条款中限定。 注释 2：将假定与控制符号的数目对应的假想 PCFICH 发送。	

[0087] 阈值Q_{in}被限定为能够比在Q_{out}下显著更可靠地接收下行链路无线电链路质量的水平，并且将与在表2中指定的发送参数的情况下考虑到PCFICH错误的假想PDCCH发送的2%块出错率对应。

[0088] [表2]

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[0089]

属性	值
DCI 格式	1C
控制 OFDM 符号的数目	2；带宽 ≥ 10 MHz 3；3 MHz ≤ 带宽 ≤ 10 MHz 4；带宽 = 1.4 MHz
聚合级别（CCE）	4
PDCCH RE 能量与平均 RS RE 能量的比	0 dB：当单个天线端口被 PCell 用于小区特定基准信号发送时。 -3 dB：当两个或四个天线端口被 PCell 用于小区特定基准信号发送时。
PCFICH RE 能量与平均 RS RE 能量的比	4 dB：当单个天线端口被 PCell 用于小区特定基准信号发送时。 1 dB：当两个或四个天线端口被 PCell 用于小区特定基准信号发送时。
注释 1：DCI 格式 1C 在 TS 36.212 [21]中的 5.3.3.1.4 条款中限定。 注释 2：将假定与控制符号的数目对应的假想 PCFICH 发送。	

[0090] 当更高层信令指示用于受限无线电链路监测的特定子帧时，可以监测无线电链路质量。

[0091] 无线电链路故障(RLF)

[0092] 1)在RRC_CONNECTED下检测物理层问题：

[0093] 当在T300、T301、T304和T311均未正在运行的同时从下层接收到PCell的N310个连续“不同步”指示时，UE可以启动定时器T310。

[0094] 2)物理层问题的恢复：

[0095] 当在T310正在运行的同时从下层接收到PCell的N311个连续“同步”指示时，UE可以停止定时器T310，或者如果正在运行，则停止定时器T312。

[0096] 在这种情况下，UE在没有明确信令的情况下保持RRC连接，即UE保持整个无线电资源配置。

[0097] “同步”和“不同步”均不由层1报告的时间段不影响连续“同步”或“不同步”指示的数目的评估。

[0098] 3)无线电链路故障的检测：

[0099] UE可以考虑要在以下项中的至少一个检测的无线电链路故障(S907)：在T310期满时、在T312期满时、在T300、T301、T304和T311均未正在运行的同时来自MAC的针对PCell的随机接入问题指示时，或者当来自RLC的对于SRB来说已经达到重新发送的最大数目的指示时。

[0100] 当触发切换过程时并且当发起连接重新建立过程时，定时器T310在检测到物理层问题时(即，在从下层接收到N310(N310＝从下层接收的连续“不同步”指示的最大数目)个连续不同步指示时)启动，并且在从下层接收到N311(N311＝从下层接收的连续“同步”指示的最大数目)个连续同步指示时停止。如果未激活安全，则定时器T310期满，UE否则转向RRC_IDLE并且发起连接重新建立过程。

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[0101] 当小区重新选择并且由上层中止连接建立时，定时器T300启动RRCConnectionRequest的发送并且停止RRCConnectionSetup或RRCConnectionReject消息的接收。在发送RRCConnectionReestabilshmentRequest时定时器T310启动，而在接收到RRCConnectionReestablishment或RRCConnectionReestablishmentReject消息时以及在所选择的小区变得不适合时定时器T310停止。在接收到包括MobilityControl Info的RRCConnectionReconfiguration消息或者接收到包括CellChangeOrder的MobilityFromEUTRACommand消息时定时器T304启动，而在满足针对切换到EUTRA的成功完成或者小区改变顺序的准则(在RAT间的情况下在目标RAT中指定该准则)时定时器T304停止。最终，定时器T311在发起RRC连接重新建立过程时启动，而在执行适合的E-UTRA小区或者使用另一RAT的小区的选择时停止。

[0102] 另外，UE可以在VarRLF-Report中通过如下设置其字段来存储以下无线电链路故障信息：

[0103] i)若有的话，UE可以清除包含在VarRLF-Report中的信息；

[0104] ii)UE可以将plmn-IdentityList设置为包括由UE存储的EPLMN的列表(即，包括RPLMN)；

[0105] iii)UE可以基于直到UE检测到无线电链路故障的时刻所收集的测量结果来将measResultLastServCell设置为包括PCell的RSRP和RSRQ(如果可用)；

[0106] iv)UE可以将measResultNeighCells设置为包括被排序为使得最佳小区被首先列举并且基于直到UE检测到无线电链路故障的时刻所收集的测量结果的除PCell以外的最佳测量的小区；

[0107] v)UE可以设置locationInfo的内容(即，locationCoordinates、horizontalVelocity)；

[0108] vi)UE可以将failedPCellId设置为全局小区标识(如果可用)，否则设置为物理小区标识以及检测到无线电链路故障的PCell的载波频率；并且

[0109] vii)UE可以将connectionFailureType设置为rlf，将c-RNTI设置为PCell中使用的C-RNTI，并且将rlf-Cause设置为用于检测无线电链路故障的触发器。

[0110] UE将无线电链路故障报告给eNB(S911)。

[0111] 图10是在来自RLC的已经达到重新发送的最大数目的指示时的RLF的示例。

[0112] RLC状态PDU作为对发送RLC的反馈被报告，请求重新发送丢失的PDU。当反馈状态报告是可配置的时，然而报告通常包含关于多个PDU的信息并且被相对不频繁地发送。基于所接收的状态报告，在发送器处的RLC实体能够采取适当的动作，并且在被请求的情况下重新发送丢失的PDU。

[0113] 关于图10，在时间t＝t1，已发送直到n+5的PDU。仅PDU n+5已到达，并且PDU n+3和n+4丢失。这能够使重新排序定时器启动。然而，在这个示例中没有PDU在定时器的期满之前到达。定时器的期满在时间t＝t2触发接收器，以向其对等实体发送包含指示丢失的PDU的状态报告的控制PDU。控制PDU具有比数据PDU高的优先级，以避免状态报告被不必要地延迟并且负面地影响重新发送延迟。当在时间t＝t3接收到状态报告时，发送器知道直到n+2的PDU已经被正确地接收并且重新发送窗口被提前。丢失的PDU n+3和n+4被重新发送，并且这次被正确地接收。在该示例中，重新发送通过接收到状态报告而触发。然而，因为混合ARQ和

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RLC协议位于同一节点中，所以这两者之间的紧密交互是可能的。在包含PDU n+3和n+4的传输块已失败的情况下，发送端处的混合ARQ协议因此能够通知发送端处的RLC。RLC能够使用这个来触发丢失的PDU的重新发送，而无需等待明确的RLC状态报告，因此减少与RLC重新发送关联的延迟。

[0114] 最终，在时间t＝t4，包括重新发送的所有PDU已经由发送器传送并且被成功地接收。因为n+5是发送缓冲器中的最后一个PDU，所以发送器通过在最后一个RLC数据PDU的报头中设置标志来从接收器请求状态报告。当接收到设置有标志的PDU时，接收器将通过发送所请求的状态报告来响应，对直到n+5并且包括n+5的所有PDU进行确认。状态报告由发送器的接收使所有PDU被声明为被正确地接收，并且发送窗口被提前。

[0115] 如早前所提及的，可能由于多个原因而触发状态报告。然而，为了控制状态报告的量并且为了避免由于过度数目的状态报告而使返回链路泛滥，能够使用状态禁止定时器。利用这种定时器，不能够比每如由定时器确定的时间间隔一次更频繁地发送状态报告。

[0116] 针对初始发送，依赖动态的PDU大小作为用于处理变化的数据速率的手段是相对直接的。然而，信道条件和资源的量还可以在RLC重新发送之间改变。为了处理这些变化，能够对已经发送的PDU进行(重新)分段以便于重新发送。以上所描述的重新排序和重新发送机制将适用；PDU被假定为在已经接收到所有段时被接收。状态报告和重新发送在单独的段上操作；仅需要重新发送PDU的丢失的段。

[0117] 图11是用于执行RRC连接重新建立的概念图。

[0118] 这个过程的目的在于重新建立RRC连接，这包括SRB1(信令无线电承载1)操作的重新开始、安全的重新激活以及仅PCell的配置。

[0119] 已激活安全的处于RRC_CONNECTED下的UE可以发起所述过程，以便继续RRC连接。只有当所涉及的小区准备好(即，具有有效的UE上下文)时，连接重新建立才成功。在E-UTRAN接受重新建立的情况下，SRB1操作在其它无线电承载的操作保持暂停的同时重新开始。如果尚未激活AS(接入层)安全，则UE不发起所述过程，而是替代地直接移动到RRC IDLE。

[0120] UE将仅在已经激活AS安全时发起所述过程(S1201)。UE在满足以下条件中的一个时发起所述过程：

[0121] -在检测到无线电链路故障时；

[0122] -在切换故障时；

[0123] -在来自E-UTRA故障的移动性时；

[0124] -在来自下层的完整性检查故障指示时；以及

[0125] -在RRC连接重新配置故障时。

[0126] 当EUTRAN从UE接收到RRCConnectionReestablishmentRequest消息(S1101)时，EUTAN向UE发送RRCConnectionReestablishment命令(S1103)。另外，UE能够向EIRTAN发送RRCConnectionReestablishmentComplete消息，以便通知RRC连接重新建立的完成(S1105)。

[0127] 图12是针对双重连接性的无线电协议架构中的一个的概念图。

[0128] 在LTE版本12中，对双重连接性的新研究(即，LE连接至MeNB(1201)和SeNB(1203)二者)被示出在图12中。在此图中，MeNB(1201)与SeNB(1203)之间的接口被称作Xn接口

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(1205)。Xn接口(1205)被假定为非理想的:即,Xn接口中的延迟可能多达60ms,但是它不限于此。

[0129] 如图12中所示,为了支持双重连接性,潜在解决方案中的一个是让UE(1207)利用被称作双重RLC/MAC方案的新RB结构来向MCG和SCG二者发送数据,其中单个RB针对一个方向具有一个PDCP-两个RLC-两个MAC,并且为每个小区配置RLC/MAC对。这个方案被称作"分割承载"方案(S1209)。

[0130] 为了增加吞吐量或者卸载业务,UE可以与两个单独的eNB(即,MeNB(1201)和SeNB(1203))具有双重连接性。

[0131] 根据业务条件,每个eNB能够针对UE具有多个服务小区,并且跨属于eNB的服务小区管理资源。因此,当UE针对服务小区执行无线电链路监测(RLM)时,UE将向对应eNB报告针对服务小区是否存在无线电链路问题。即,UE向SeNB(1203)直接报告在SeNB(1203)的控制下的服务小区上是否存在无线电链路问题。

[0132] 然而,在SeNB(1203)下的服务小区的添加/去除/修改可能由MeNB(1201)执行,因为MeNB(1201)主要根据业务条件来决定是否将数据卸载到SeNB(1203)。因此,MeNB(1201)应该知道在SeNB(1203)下的服务小区由于一些情况的无线电链路问题。另外,可能存在UE不能够向SeNB指示无线电链路问题的情况。

[0133] 图13是根据本发明的实施方式的用于报告无线电链路问题的概念图。

[0134] 发明了当UE连接至两个单独的基站(即,MeNB和SeNB)时,UE能够从第一基站(BS)或第二BS中的至少一个接收指示符(S1301)。

[0135] 期望地,第一BS可以是MCG中的MeNB而第二BS可以是SCG中的SeNB,并且反之亦然。

[0136] 期望地,指示符指示哪一个小区是第二BS的第一小区。

[0137] 由SeNB服务的服务小区当中的至少一个服务小区由第一BS或第二BS指定为第一小区。

[0138] 第一BS或第二BS能够通过向UE发送无线电资源控制(RRC)或介质访问控制(MAC)信令(包括服务小区标识符)来指示哪一个服务小区被指定为第一小区。

[0139] 按照这种方式,确定第一小区的基站以及向UE发送指示第一小区的RRC或MAC信令的基站可以不同。例如,MeNB确定第一小区,而SeNB向UE通知第一小区。如果MeNB确定第一小区,则MeNB通过经由Xn接口向SeNB发送包括服务小区标识符的消息来向SeNB通知第一小区。

[0140] 当UE从第一BS或第二BS接收到指示要用作第一小区的服务小区的RRC或MAC信令时,UE可以将所指示的服务小区认为是第一小区。

[0141] 另选地,在未从第一BS或第二BS接收到明确地指示第一小区的RRC或MAC信令的情况下,如果服务小区满足如下特定条件,则UE能够将该服务小区明确地认为是第一小区:

[0142] -如果服务小区被配置有PRACH;

[0143] -如果服务小区被配置有PUCCH;

[0144] -如果服务小区支持基于竞争的RA过程;或者

[0145] -如果服务小区被配置为从不停用。

[0146] 在这种情况下,第一小区可以是被允许执行基于竞争的随机接入过程或者被配置有物理上行链路控制信道(PUCCH)的、总是在第二BS中被激活的至少一个。

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[0147] UE可以在属于第二BS的小区上检测无线电链路问题(S1303)。另外,UE检查在由S1301的步骤指示的第一小区上是否出现无线电链路问题(S1305)。

[0148] 如果满足特定条件,则UE能够检测第一小区上的无线电链路问题。这些条件可以如下:

[0149] -当例如第一小区不同步达配置的持续时间时,检测到物理层问题。

[0150] -当例如对于RLC PDU来说已经到达重新发送的最大数目时,数据在第一小区上被发送的RLC实体检测到问题。

[0151] -当例如已经达到第一小区上的随机接入前导码重新发送的最大数目时,检测到MAC层问题。

[0152] 期望地,第一小区在双重连接性中可以是SCG中的PSCell(主SCell),但是不限于此。

[0153] 根据S1305的结果,如果UE检测到在第一小区上出现无线电链路问题,则UE能够将第一小区上的无线电链路问题直接报告给第一BS(S1307)。另外,UE停止在由第二BS服务的所有服务小区上的任何UL发送/接收(S1309)。

[0154] 期望地,当UE将无线电链路问题指示直接报告给第一BS时,无线电链路问题指示能够包括下列项:

[0155] -第一小区的标识符

[0156] -UE的标识符

[0157] -无线电链路问题的原因。

[0158] 当第一BS从UE接收到无线电链路问题指示时,第一BS通过经由Xn接口发送包括服务小区的标识符、UE的标识符或者无线电链路问题的原因在内的消息来向第二BS通知第一小区上的无线电链路问题。

[0159] 当第一BS从UE接收到无线电链路问题指示时,第一BS可以去除或者停用第一小区,或者必要时向第二BS通知第一小区去除/停用。

[0160] 此外,配置有双重连接性的UE执行用于报告SCG无线电链路故障的过程。如果有双重连接性能力的UE检测到SCG故障,则UE可以发起UEFailureIndication消息的发送。

[0161] UE可以将UEFailureIndication消息的内容设置为包括RLF-Cause,并且如果UE发起UEFailureIndication消息的发送以提供SCG无线电链路故障信息,则UE将其设置为用于检测SCG无线电链路故障的触发器。UE可以将UEFailureIndication消息提交给下层以便于发送。

[0162] 针对双重连接性,PSCell支持无线电链路故障过程。然而,当在此SCell上检测到RLF时,不在第一阶段结束触发重新建立过程。替代地,UE可以向第一BS通知PSCell的无线电链路故障。

[0163] 另一方面,根据S1305的结果,如果UE检测到在由除第一小区以外的第二BS服务的服务小区上出现无线电链路问题,则UE不做任何事(S1311)。

[0164] 例如,UE MAC或UE RLC不将该问题指示给UE RRC,UE RRC不将无线电链路问题报告给第一BS或第二BS,或者UE在出现无线电链路问题的服务小区上保持UL发送(S1311)。

[0165] 图14是根据本发明的实施方式的通信设备的框图。

[0166] 图14中所示的设备可以是适于执行上述机制的用户(UE)和/或eNB,但是它可以是

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用于执行相同操作的任何设备。

[0167] 如图14中所示，该设备可以包括DSP/微处理器(110)和RF模块(收发器;135)。DSP/微处理器(110)与收发器(135)电连接并控制它。该设备还可以基于其实施方式以及设计者的选择来包括电源管理模块(105)、电池(155)、显示器(115)、键区(120)、SIM卡(125)、存储器装置(130)、扬声器(145)和输入装置(150)。

[0168] 具体地，图14可以表示包括被配置为从网络接收请求消息的接收器(135)以及被配置为将发送或接收定时信息发送给网络的发送器(135)的UE。这些接收器和发送器能够构成收发器(135)。UE还包括连接至收发器(135;接收器和发送器)的处理器(110)。

[0169] 另外，图14可以表示包括被配置为向UE发送请求消息的发送器(135)以及被配置为从UE接收发送或接收定时信息的接收器(135)的网络设备。这些发送器和接收器可以构成收发器(135)。该网络设备还包括连接至发送器和接收器的处理器(110)。该处理器(110)可以被配置为基于发送或接收定时信息来计算等待时间。

[0170] 对于本领域技术人员而言将显而易见的是，可以在不脱离本发明的精神或范围的情况下对本发明做出各种修改和改变。因此，本发明旨在涵盖此发明的落入所附的权利要求及其等同物的范围内的修改和改变。

[0171] 在下文中描述的本发明的实施方式是本发明的元素和特征的组合。除非另外提及，否则这些元素或特征可以被认为是选择性的。每个元素或特征可以在不与其它元素或特征组合的情况下被实践。此外，可以通过组合元素和/或特征的部分来构造本发明的实施方式。可以重新布置本发明的实施方式中描述的操作顺序。任何一个实施方式的一些构造可以被包括在另一实施方式中，并且可以用另一实施方式的对应构造代替。对于本领域技术人员而言明显的是，所附的权利要求中的未彼此明确地被引用的权利要求可以以组合方式被呈现为本发明的实施方式，或者在提交本申请之后通过后续修正案作为新的权利要求被包括。

[0172] 在本发明的实施方式中，被描述为由BS执行的特定操作可以由BS的上层节点执行。即，显而易见的是，在由包括BS的多个网络节点构成的网络中，为了与MS通信而执行的各种操作可以由BS或除该BS以外的网络节点执行。术语“eNB”可以用术语“固定站”、“节点B”、“基站(BS)”、“接入点”等替换。

[0173] 以上描述的实施方式可以通过各种手段(例如，通过硬件、固件、软件或其组合)来实现。

[0174] 在硬件配置中，根据本发明的实施方式的方法可以由以下项来实现：一个或更多个专用集成电路(ASIC)、数字信号处理器(DSP)、数字信号处理器件(DSPD)、可编程逻辑器件(PLD)、现场可编程门阵列(FPGA)、处理器、控制器、微控制器或微处理器。

[0175] 在固件配置或软件配置中，可以按照执行以上描述的功能或操作的模块、过程、函数等的形式实现根据本发明的实施方式的方法。软件代码可以被存储在存储器单元中并且由处理器执行。存储器单元可以位于处理器内部或外部，并且可以经由各种已知手段向处理器发送数据以及从处理器接收数据。

[0176] 本领域技术人员将领会的是，可以在不脱离本发明的精神和必要特性的情况下按照除本文所阐述的方式外的其它特定方式执行本发明。上述实施方式因此将在所有方面被解释为例示性的，而不是限制性的。本发明的范围应该由所附的权利要求及其合法等同物

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来确定，而不由上述描述来确定，并且落入所附的权利要求的意义和等价范围内的所有改变旨在被包含在本文中。

[0177] 工业实用性

[0178] 虽然已经围绕应用于3GPP LTE系统的示例描述了以上描述的方法，但是本发明适用于除3GPP LTE系统之外的各种无线通信系统。

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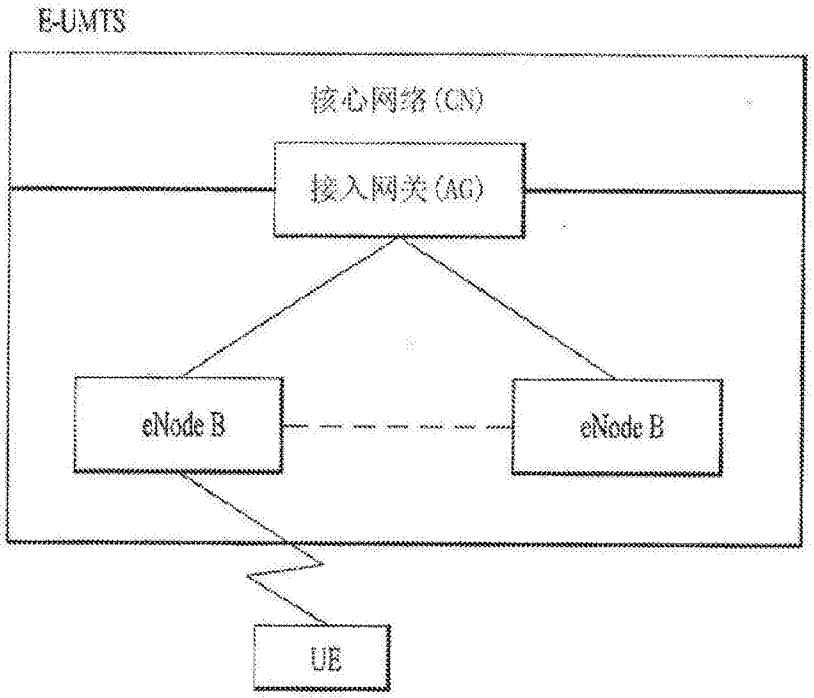


图1

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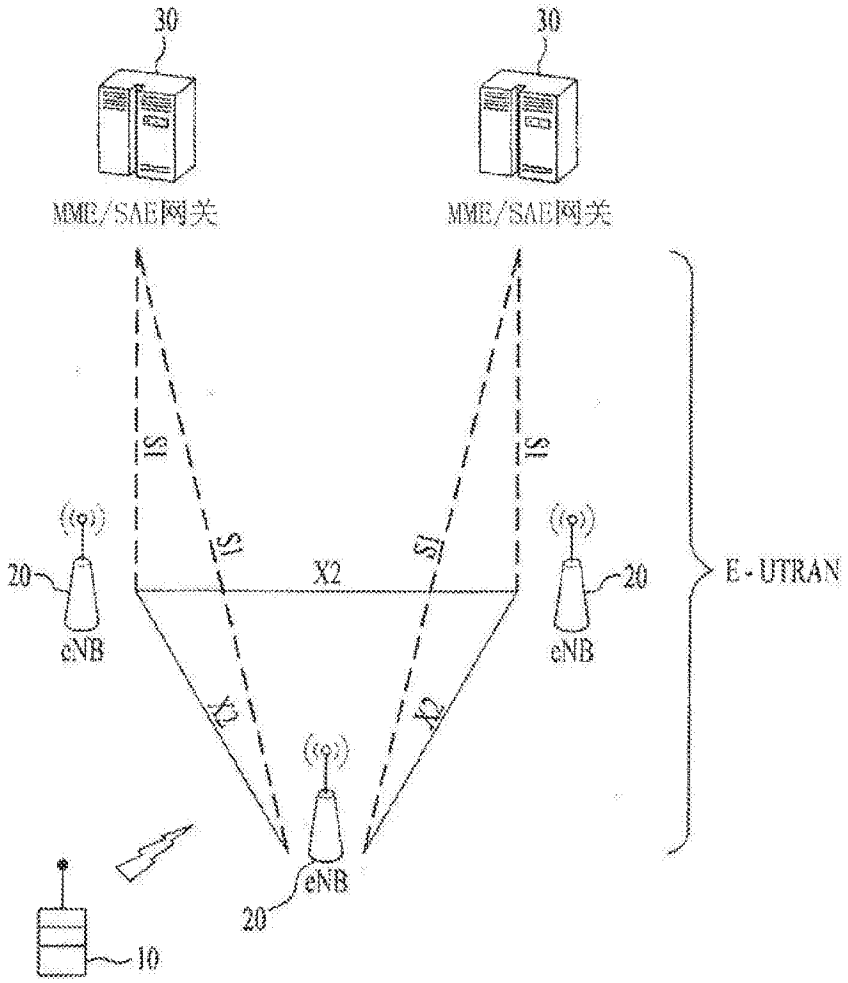


图2A

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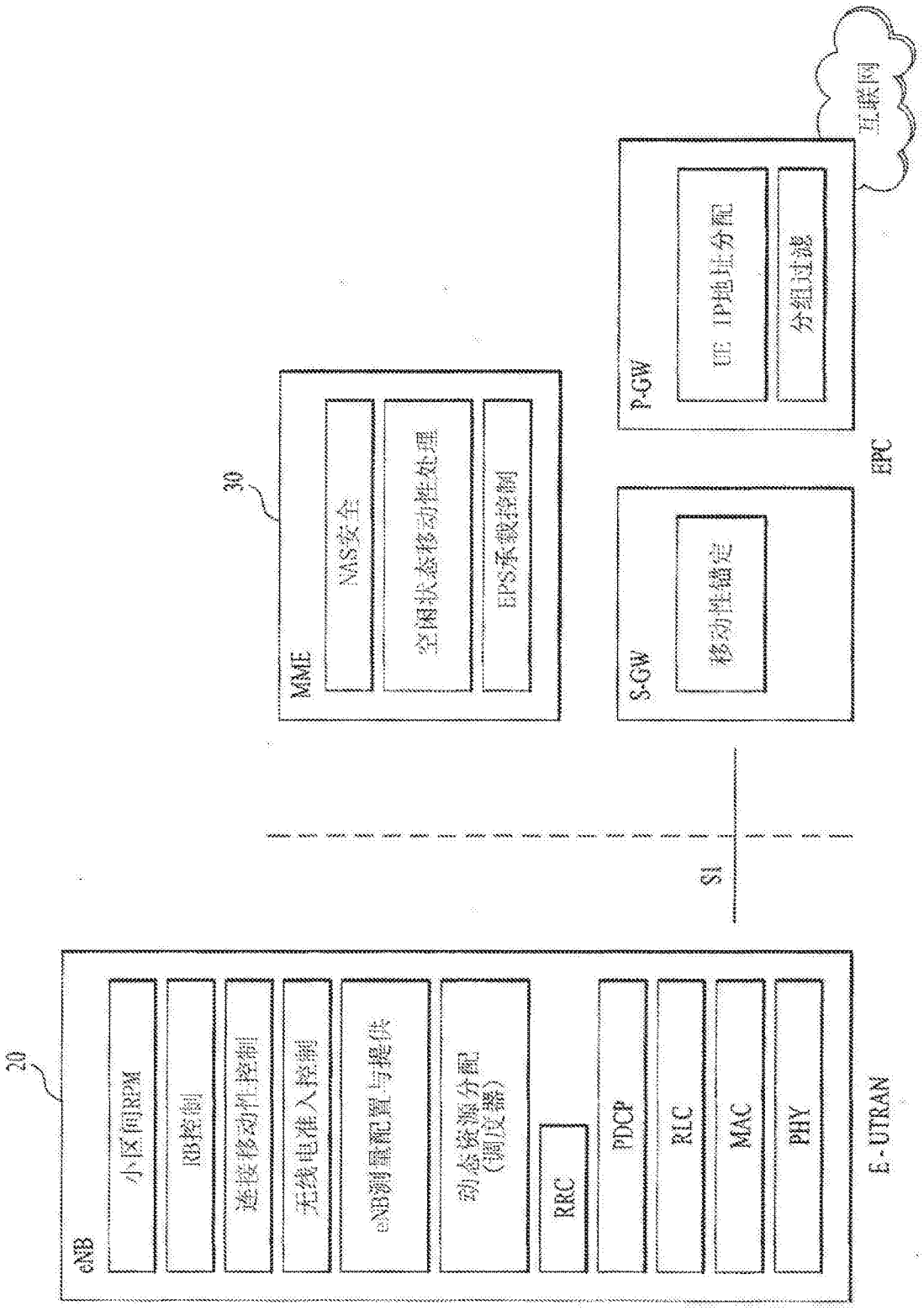
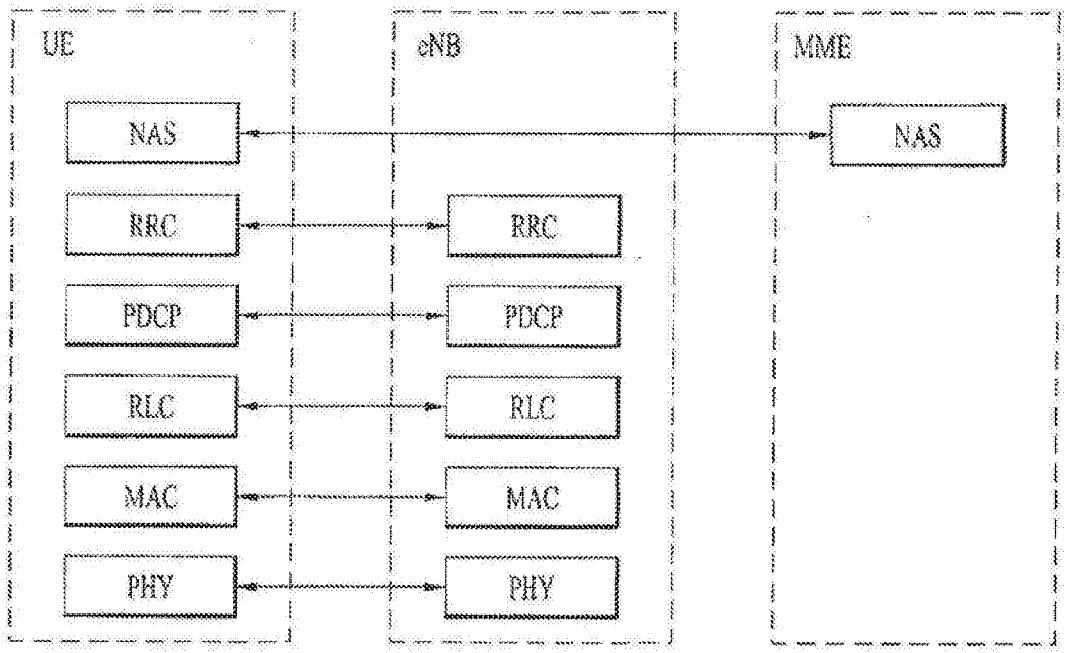
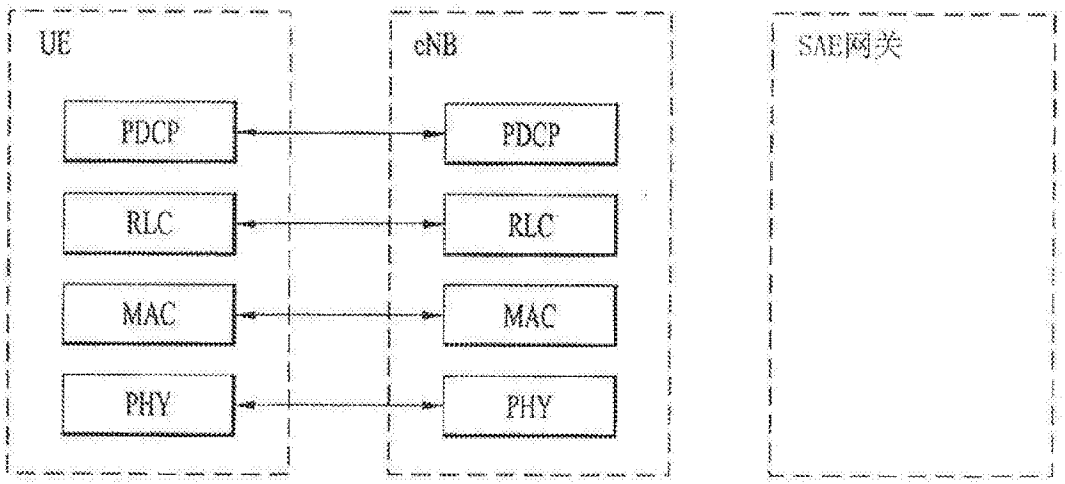


图2B

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(a)控制平面协议栈



(b)用户平面协议栈

图3

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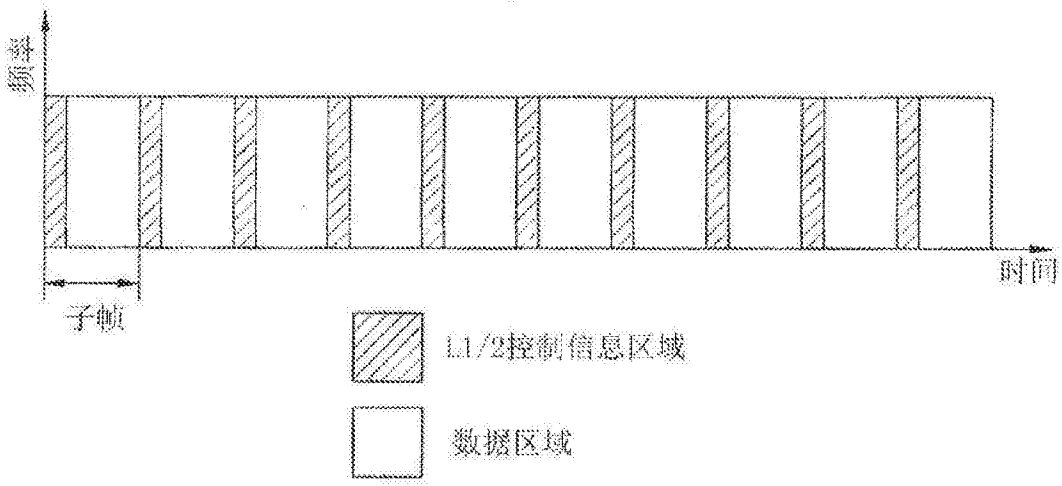


图4

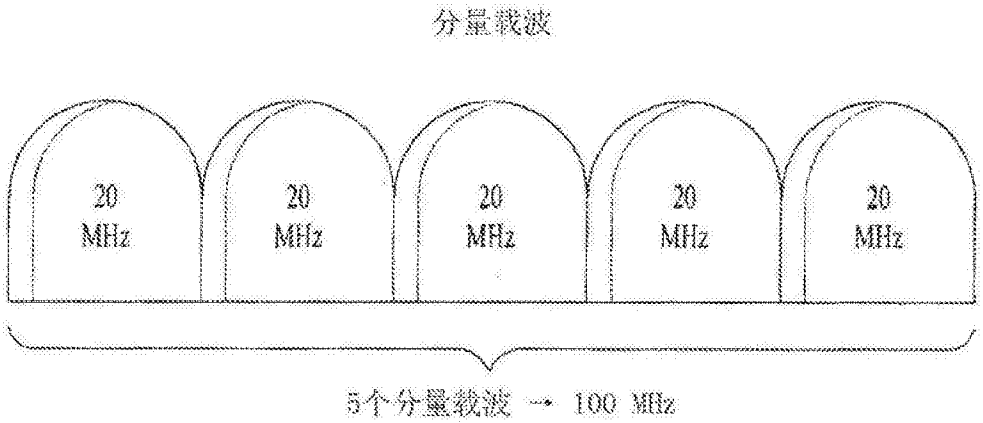


图5

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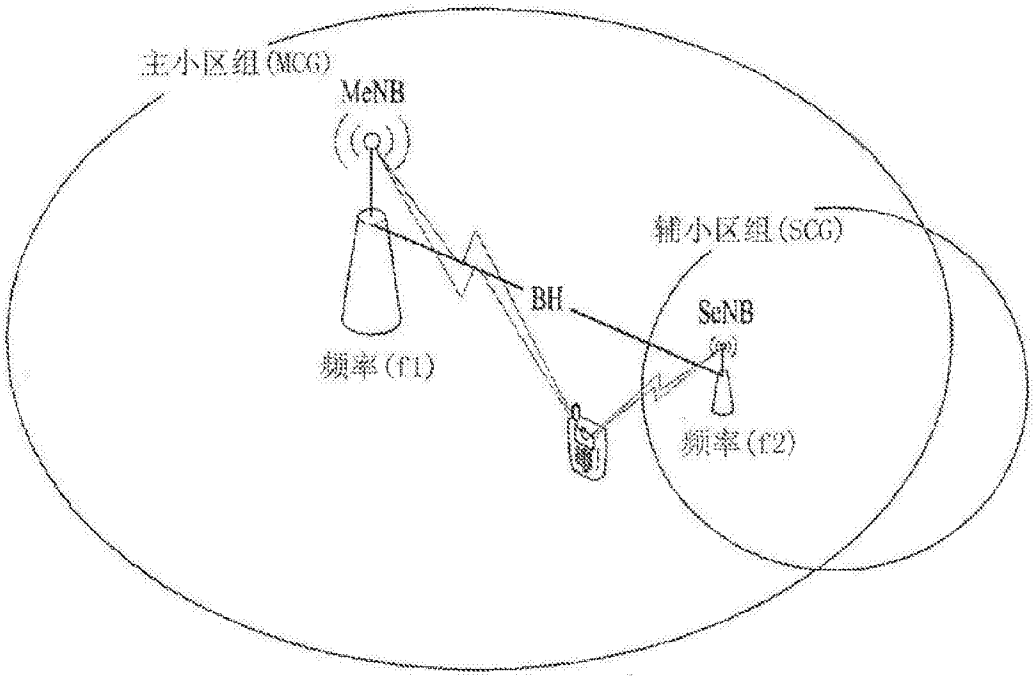
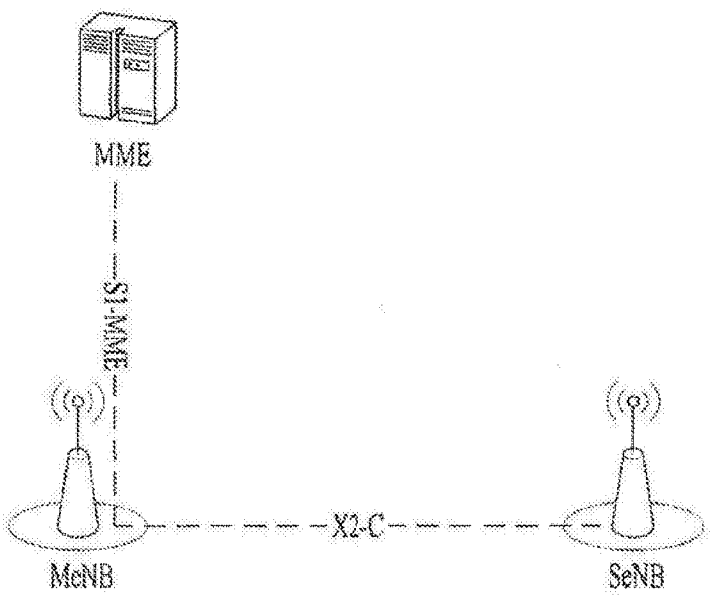


图6



(a)双重连接性中涉及的eNB的C平面连接性

图7

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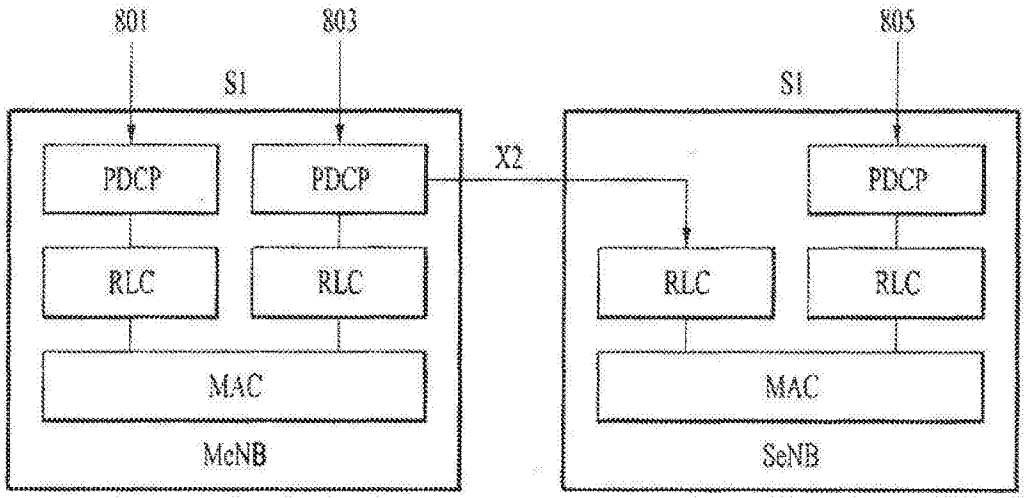


图8

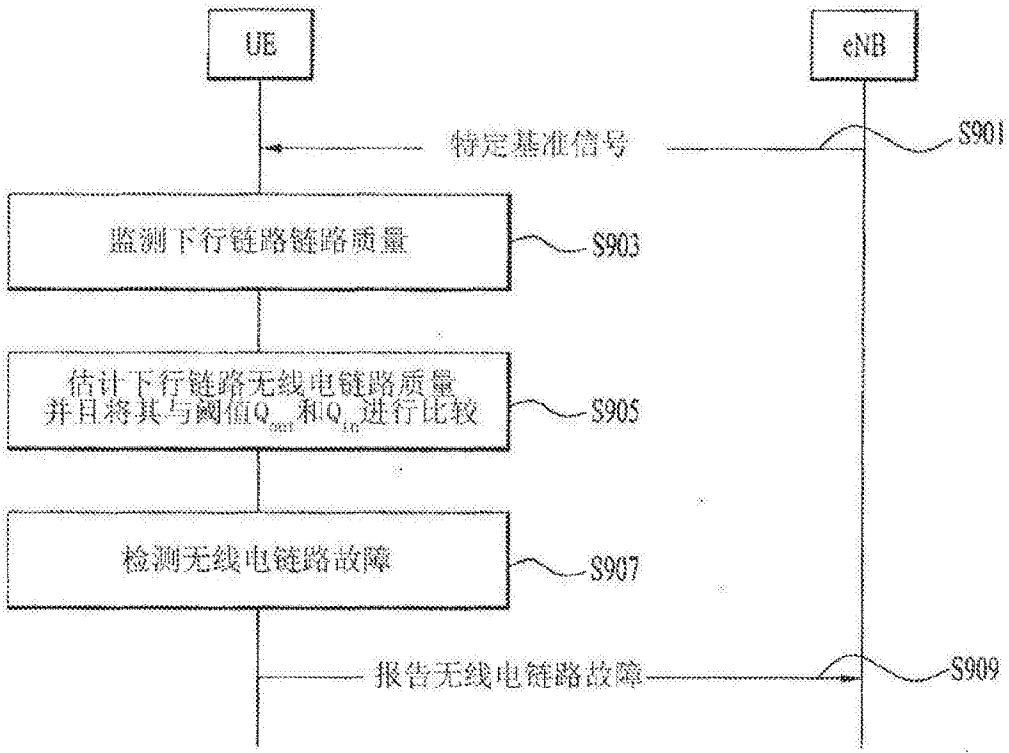


图9

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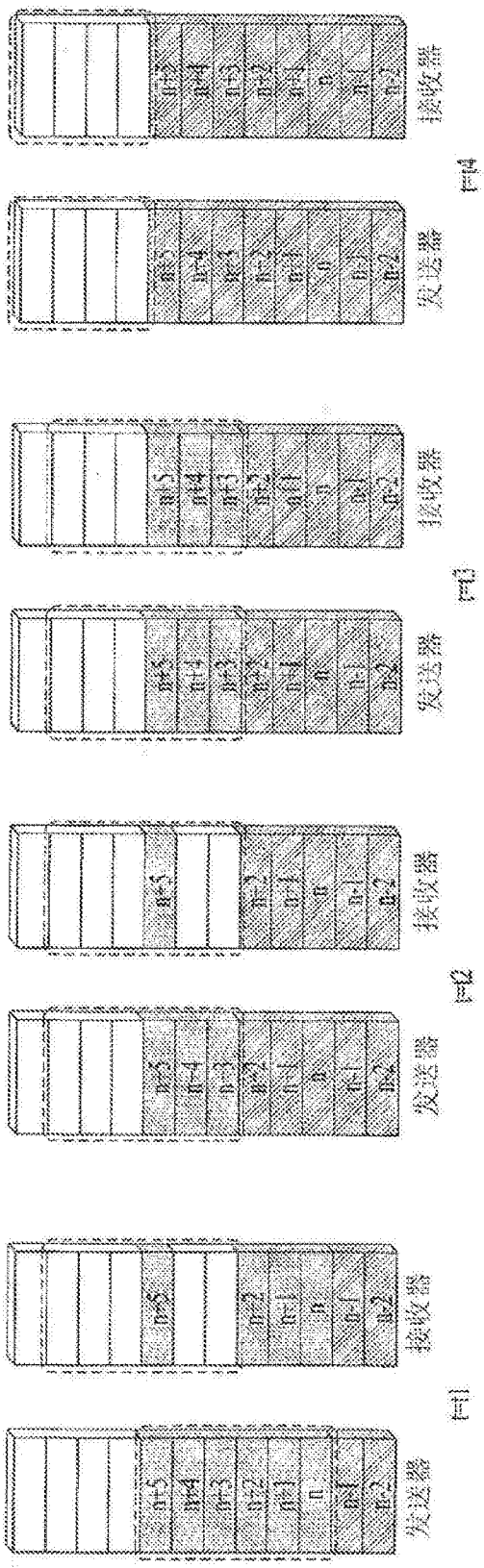


图10

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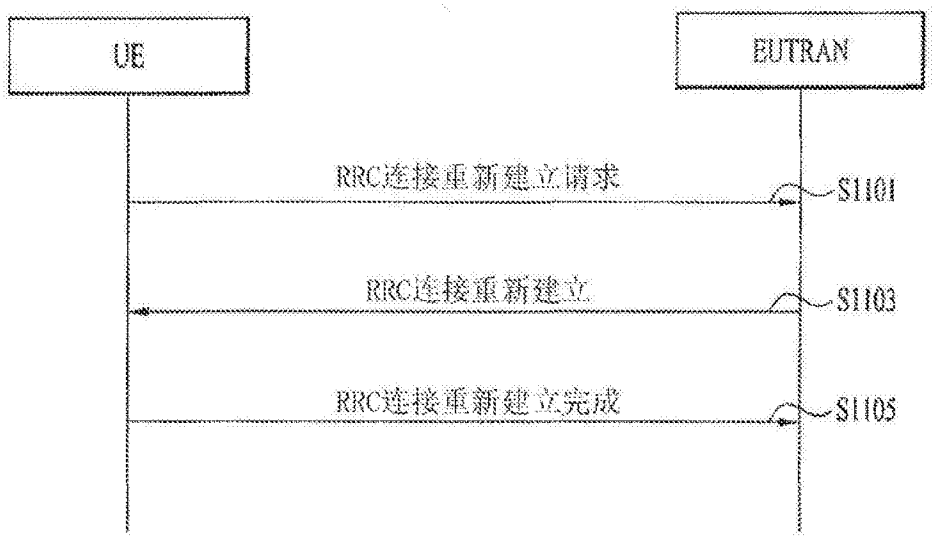


图11

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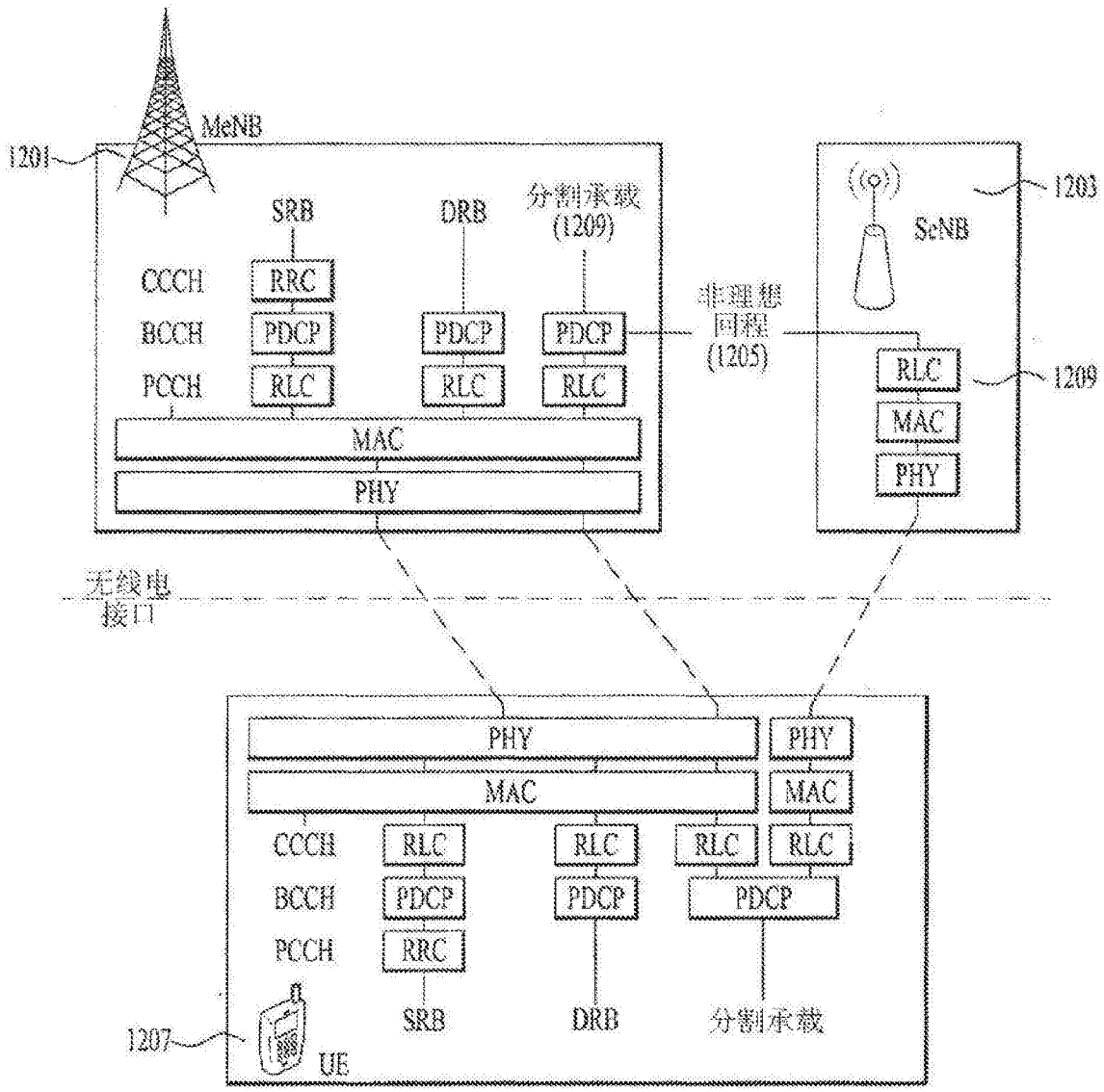


图12

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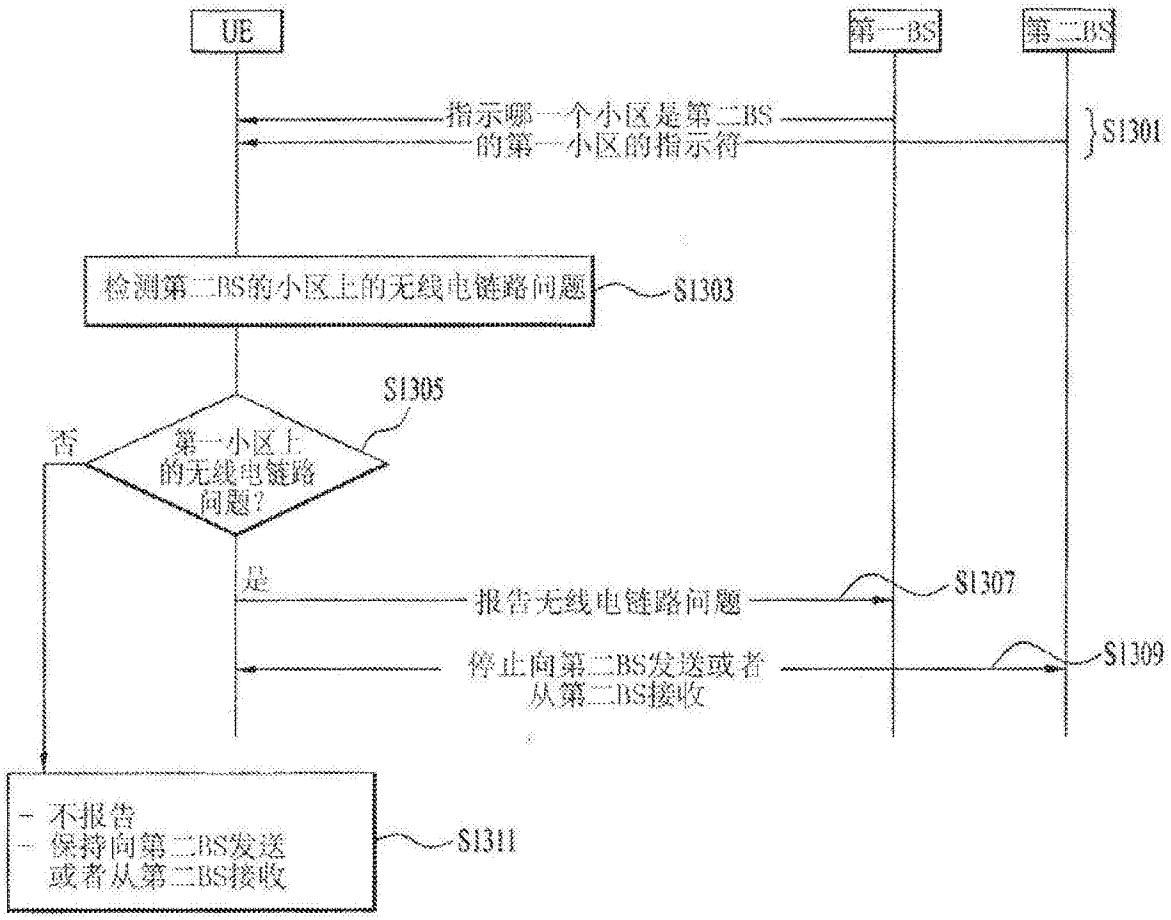


图13

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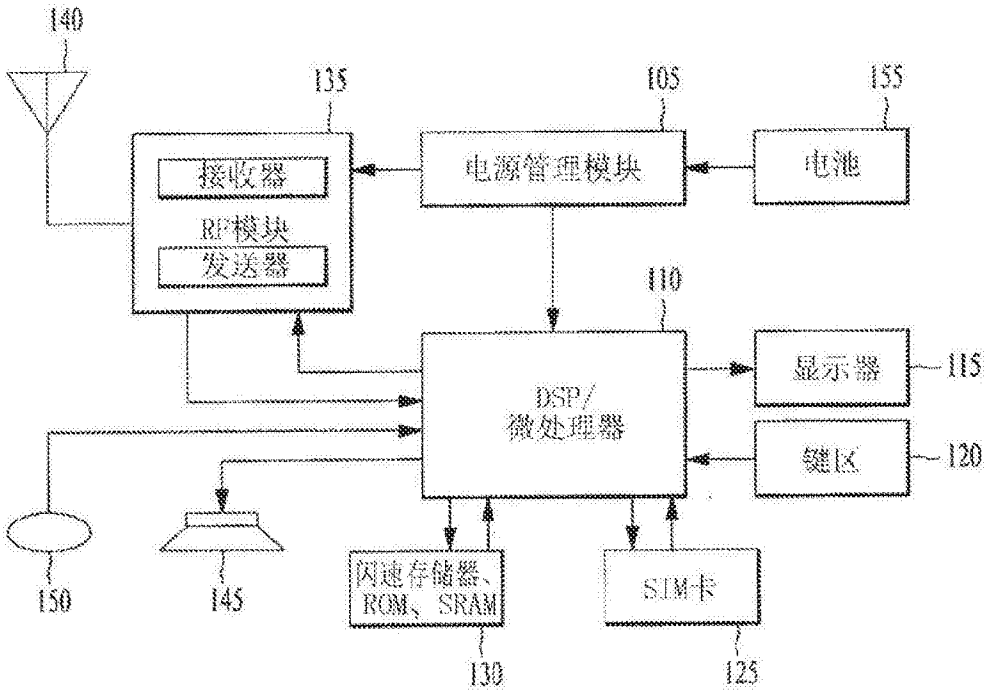


图14

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[Continued on next page]

(54) Title: PROHIBITING FAILURE INDICATIONS FOR SECONDARY CELL GROUP FAILURE

(57) Abstract: In an aspect, a UE operating in a network that supports dual connectivity operation is configured to minimize the transmission of unnecessary UE failure indications. The UE detects secondary cell group (SCG)failure for the UE, in response to detecting one of a plurality of SCG failure-triggering events. The UE sends a UE failure indication message, in response to the detecting SCG failure, and refrains from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled. In some cases, the UE sets a state of the UE to a UE prohibit state to prohibit sending further UE failure indication messages while in the UE prohibit state. In other cases, the UE starts a prohibit timer to prohibit sending further UE failure indication messages during the prohibit timer.

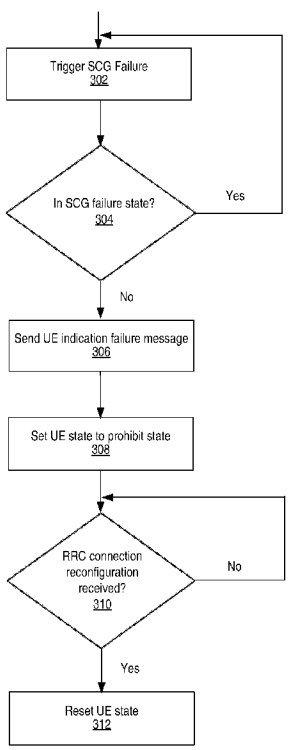


FIG. 3

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PROHIBITING FAILURE INDICATIONS FOR SECONDARY CELL GROUP FAILURE

TECHNICAL FIELD

The present invention generally relates to wireless communication networks, and particularly relates to failure detection and notification.

BACKGROUND

The 3rd Generation Partnership Project (3GPP) is specifying the Evolved Universal Terrestrial Radio Access Network (E-UTRAN) consisting of the Long Term Evolution (LTE) and System Architecture Evolution (SAE) concepts. The architecture of the LTE system is shown in Figure 1.

LTE dual connectivity is a feature defined from the user equipment (UE) perspective, where the UE may simultaneously receive data from and transmit data to two different eNBs. This feature is part of 3GPP Rel-12. The two different eNBs are usually denoted as Master eNodeB (MeNB) and Secondary eNodeB (SeNB). Operating on different frequencies, the MeNB and SeNB provide separate cell groups for the UE, a master cell group (MCG) and a secondary cell group (SCG).

The protocol architecture for Release 12 (Rel-12) of the 3GPP specifications for LTE, as shown in Figure 2, supports three types of radio bearers: MeNB bearers, split bearers, and SeNB bearers. In pre-Rel-12 LTE, i.e., before the introduction of dual connectivity, handover failures (HOF) and radio link failures (RLF) are detectable by the UE. The UE tries to reestablish its connection upon detection of such a failure. Otherwise, it goes to IDLE.

In detail, the following detection methods were considered. A handover failure timer, such as a T304 timer, is started upon reception of a radio resource control (RRC) connection reconfiguration message that includes mobility control information. The T304 timer is stopped upon successful random access to a target handover cell. Expiration of the T304 timer triggers a procedure for reestablishment of the RRC connection. A reestablishment timeout timer, such as a T311 timer, is started when the UE tries to reestablish RRC connection, and the T311 timer is stopped when successfully reestablished. At expiration of the T311 timer, the UE goes to IDLE or declares that reestablishment is unsuccessful. A detection of physical-layer (PHY) failure timer, such as a T310 timer, is started when a physical layer problem is indicated by physical layer, and the T310 timer is stopped when the physical-layer failure is indicated as being resolved by the physical layer. Upon expiration of the physical-layer failure timer, reestablishment of an RRC connection is triggered. The T310 timer can only be started if

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reestablishment is not already ongoing (i.e., only if T311 is not running), and only after successful handover (i.e., only if T304 is not running).

Other failure detection methods include a random access procedure (random access channel or RACH) failure that triggers reestablishment of an RRC connection if reestablishment is not already ongoing (T311 is not running), and only after successful handover (T304 is not running). A radio link control (RLC) failure triggers reestablishment of an RRC connection, if reestablishment not already ongoing (T311 is not running). RLC failure cannot happen when T304 is running, since a random access procedure is pending during that time period and RLC retransmissions have not yet been started.

For dual connectivity, a new event, known as secondary-cell-group failure (SCG failure) or SeNB radio-link failure (S-RLF), has been introduced. When this event is triggered, the UE stops uplink transmission in the SeNB, suspends SCG and split bearers, and sends an indication to the MeNB. The indication is sent via an RRC message in uplink and can be called a "UE failure indication," which can be regarded as an "SCG Failure Information message.

The following are considered to be SCG failure-triggering events. An SCG change failure timer (also known as a T307 timer), is started when SCG change is triggered, and stopped after successful random access to a new SCG. The SCG change failure timer is similar to the pre-Rel-12 T304 handover failure timer, but being related to the SCG, the procedure similar to handover is called SCG change. If the SCG change failure timer expires, the UE triggers failure indication, with an RRC message to the MeNB. An SCG physical layer (PHY) failure timer (also known as a T313 timer), is started when an SCG PHY problem is detected, but SCG change is currently not ongoing (the SCG change failure timer is not running). The SCG PHY failure timer is similar to the pre-Rel-12 radio link failure timer T310, but the SCG PHY failure timer is related to the SCG. This SCG PHY failure timer is stopped when an SCG physical layer problem is indicated as being resolved by SCG PHY. If the SCG PHY failure timer expires, the UE triggers failure indication in an RRC message to the MeNB. SCG MAC failure triggers the sending of a UE failure indication in an RRC message to the MeNB, if SCG change is not currently ongoing (i.e., if the SCG change failure timer is not running). SCG MAC failure occurs when the UE has repeated random access procedures and preamble transmissions more than a configurable threshold. SCG RLC failure triggers the sending of a UE failure indication RRC message to the MeNB, but SCG RLC failure cannot happen while the SCG change failure timer is running. SCG RLC failure occurs when the number of RLC retransmissions exceeds a configurable threshold.

In each of the failure events, it is assumed that the failure type is indicated in the RRC message. It is currently unclear how many UE failure indication RRC messages are sent (and

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when) to the MeNB for the concurrent SCG failure detection methods defined above. Too many UE failure indications may waste radio resources and load the MeNB unnecessarily.

SUMMARY

Embodiments of the present inventive concepts describe the prohibiting of unnecessary UE failure indications from being sent upon SCG failure detection. This can be achieved by a prohibit timer or a prohibit state in the UE.

According to some embodiments, a method, in a UE operating in a network that supports dual connectivity operation, for minimizing transmission of unnecessary UE failure indications, includes detecting SCG failure for the UE, in response to detecting one of a plurality of SCG failure-triggering events. The method also includes sending a UE failure indication message, in response to the detecting SCG failure, and refraining from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled.

In some cases, the refraining may include setting a state of the UE to a UE prohibit state to prohibit sending further UE failure indication messages while in the UE prohibit state. In other cases, the refraining may include starting a prohibit timer to prohibit sending further UE failure indication messages during the prohibit timer.

According to some embodiments, a UE is adapted to detect SCG failure for the UE, in response to detecting one of a plurality of SCG failure-triggering events, send a UE failure indication message, in response to the detecting SCG failure, and refrain from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled.

In some cases, the UE is adapted to set a state of the UE to a UE prohibit state to prohibit sending further UE failure indication messages while in the UE prohibit state. In other cases, the UE is adapted to start a prohibit timer to prohibit sending further UE failure indication messages during the prohibit timer.

According to some embodiments, a method, in a network node, for minimizing transmission of unnecessary UE failure indications includes receiving a UE failure indication message indicating that the UE is prohibited from sending UE failure indications in response to SCG failure-triggering events, and sending an RRC connection reconfiguration message to indicate to the UE that the UE is reenabled to send UE failure indications in response to SCG failure-triggering events.

According to some embodiments, a network node is adapted to receive a UE failure indication message indicating that the UE is prohibited from sending UE failure indications in

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response to SCG failure-triggering events, and send an RRC connection reconfiguration message to indicate to the UE that the UE is reenabled to send UE failure indications in response to SCG failure-triggering events.

Further embodiments may include computer program products and non-transitory computer readable media that store instructions that, when executed by processing circuit, perform the operations of the embodiments describe above.

Of course, the present invention is not limited to the above features and advantages. Indeed, those skilled in the art will recognize additional features and advantages upon reading the following detailed description, and upon viewing the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates an example architecture of LTE.

Figure 2 illustrates an architecture for 3GPP Rel-12, including support for three bearers.

Figure 3 is a flowchart illustrating a method in a UE for minimizing the transmission of unnecessary UE failure indications, according to some embodiments.

Figure 4 is a flowchart illustrating another method in a UE for minimizing the transmission of unnecessary UE failure indications, according to some embodiments.

Figure 5 is a block diagram of a UE configured to minimize the transmission of unnecessary UE failure indications, according to some embodiments.

Figure 6 is a flowchart illustrating a method in a UE for minimizing the transmission of unnecessary UE failure indications, according to some embodiments.

Figure 7 is a block diagram of a base station configured to provide information assisting a UE in minimizing the transmission of unnecessary UE failure indications, according to some embodiments.

Figure 8 is a flowchart illustrating a method in a base station for providing information assisting a UE in minimizing the transmission of unnecessary UE failure indications, according to some embodiments.

Figure 9 is a block diagram of a functional implementation of a UE for minimizing the transmission of unnecessary UE failure indications, according to some embodiments.

Figure 10 is a block diagram of a functional implementation of a base station for providing information assisting a UE in minimizing the transmission of unnecessary UE failure indications, according to some embodiments.

DETAILED DESCRIPTION

In LTE dual-connectivity scenarios, a UE failure indication upon SCG failure may be transmitted multiple times. This is due to the fact that the evaluations of SCG PHY, SCG RACH

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and SCG RLC failure detection run in parallel, independently of each other. In LTE legacy behavior, concurrent SCG PHY, RACH, and RLC failure detection is handled by avoiding subsequent triggering of reestablishment if a T311 timer is running.

Embodiments described herein provide solutions to control multiple SCG failure-triggering events in LTE dual connectivity.

Prohibit state

Figure 3 illustrates use of a UE prohibit state to minimize unnecessary UE failure indications. Once the UE triggers SCG failure (Block 302) and sends the UE failure indication message to the MeNB (Block 306), the UE considers itself in SCG failure state (Block 304). SCG failure state may be triggered due to detection of an SCG change failure timer expiration, an SCG PHY failure timer expiration, an SCG RACH failure, or an SCG RLC failure, for example. A UE state is set to a UE prohibit state (Block 308). The prohibit state may be implemented by means of a UE variable.

During this UE prohibit state, the UE is not permitted to trigger SCG failure, or send any more UE failure indications or corresponding RRC messages in response to SCG failure-triggering events. For example, the UE is prohibited from starting an SCG PHY failure timer when it is in the UE prohibit state. In another example, the UE is prohibited from sending UE failure indications when the SCG PHY failure timer expires, if the UE is in the UE prohibit state. The UE is also prohibited from sending UE failure indications when SCG RACH failure or SCG RLC failure is detected, when the UE is already in the UE prohibit state.

Upon the first successful RRC connection reconfiguration after setting the UE prohibit state (Block 310), the UE state is reset (Block 312). This means that the UE prohibit state is toggled off so that the UE is again allowed to send UE failure indications or to trigger SCG-failure state. In some cases, the UE state is reset once the SCG change failure timer is started. The UE state is reset when the UE goes from IDLE to CONNECTED, or when the UE is reconfigured to activate dual connectivity.

In some cases, the UE state is reset when the UE receives an RRC Connection Reconfiguration message reconfiguring SCG parameters, for example, either releasing the SCG or modifying it. If the UE receives an RRC Connection Reconfiguration message that only configures MCG parameters, then the UE state is not impacted.

Prohibit timer

Figure 4 illustrates use of a UE prohibit timer to minimize unnecessary UE failure indications. While in some scenarios it may be beneficial for the MeNB to be informed multiple times about potentially different SCG failures, it may be necessary to prohibit UE failure

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indications for some time. When necessary, a UE failure indication is sent (Block 406) and the prohibit timer is started when SCG failure is triggered (Block 402). SCG failure may be triggered upon detection of SCG change failure at the SCG change failure timer expiry, SCG failure due to the SCG PHY failure timer expiry, SCG RACH failure or SCG RLC failure. The prohibit timer length may be configured by the network, including with RRC messaging.

The prohibit timer will be started if the prohibit timer is not already running (Block 404). During the duration of the prohibit timer, SCG failure cannot be triggered and/or UE failure indications cannot be sent in response to SCG failure-triggering events. The prohibit timer can expire (Block 408), which will again allow the sending of UE failure indications (Option 410) or the triggering of SCG failure (Option 412).

The timer may also be stopped upon the first successful RRC connection reconfiguration after SCG failure was detected. In some cases, the SCG PHY failure timer is stopped once the SCG change failure timer is started. In some cases, the prohibit timer is stopped when the UE receives RRC Connection Reconfiguration message reconfiguring SCG parameters, such as for either releasing the SCG or modifying it. If the UE receives an RRC Connection Reconfiguration that only configures MCG parameters, then the prohibit timer is not impacted.

Expiration of the prohibit timer may also indicate that the UE did not receive an answer to the UE failure indication it tried to send. For example, the transmission failed, the MeNB did not send the answering RRC connection reconfiguration, or the transmission of the MeNB answer failed. In this case, the UE would be permitted to send another UE failure indication due to SCG failure. This may indicate that the prohibition of UE failure indications has ended.

In a further embodiment, repeated transmission of the original UE failure indication may be enforced upon expiration of the prohibit timer. In yet another embodiment, the latest reported failure type (SCG PHY, SCG MAC, SCG RACH, SCG RLC, or SCG change) should replace the failure cause of the failure type of the original UE failure indication, and the UE failure indication should be sent again. Also, current measurement results can be included in the new UE failure indication.

Some embodiments of the present inventive concepts are implemented by a UE 12 exemplified in Figure 5. The UE 12 represents any wireless device referred to as a mobile terminal, wireless terminal and/or a mobile station that may be portable, pocket-storable, hand-held, computer-comprised, or vehicle-mounted. For example, the UE 12 may be a mobile telephone, cellular telephone, laptop, tablet computer, or surf plate with wireless capability. The UE 12 is enabled to communicate wirelessly with other devices, telephones or servers via a Radio Access Network (RAN) and possibly one or more core networks, comprised within a cellular communications network or wireless communication system, sometimes also referred to

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as a cellular radio system or a cellular network. A cellular network covers a geographical area which is divided into cell areas, where each cell area is served by a radio network node. A cell is the geographical area where radio coverage is provided by the radio network node. The radio network node may be, for example, a base station such as a Radio Base Station (RBS), eNB, eNodeB, NodeB, B node, or Base Transceiver Station (BTS), depending on the technology and terminology used. The base stations may be of different classes such as a macro eNodeB, home eNodeB or pico base station, based on transmission power and cell size.

Further, each radio network node may support one or several communication technologies. The radio network nodes communicate over the air interface operating on radio frequencies with the wireless devices within range of the radio network node. In the context of various embodiments described herein, the expression downlink (DL) is used for the transmission path from the base station to the wireless device. The expression uplink (UL) is used for the transmission path in the opposite direction, such as from the wireless device to the base station.

As shown in Figure 5, the UE 12 is arranged with radio circuitry 32 to communicate with radio network nodes, a memory 36 to store information related to the embodiments, and a processing unit 30. The radio circuitry 32 is configured to receive configuration messages, such as an RRC connection reconfiguration message, from a network node such as an eNB. The radio circuitry 32 is further configured to send a UE failure indication message. Memory 36 is configured to store information related to embodiments described herein and may include any mix of storage circuits. The memory 36 may provide non-transitory storage for a computer program and configuration data. The processing unit 30 comprises appropriately configured processing circuitry, such as one or more microprocessors, microcontrollers, digital signal processors, and/or other digital logic, and is configured to process data and information signaled to and from the radio circuitry 32.

According to some embodiments, the processing unit 30 is configured to detect SCG failure for the UE, in response to detecting one of a plurality of SCG failure-triggering events, and send a UE failure indication message, in response to the detecting SCG failure. The processing unit 30 is also configured to refrain from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled.

In some cases, the processing unit 30 is adapted to set a state of the UE to a UE prohibit state to prohibit sending further UE failure indication messages while in the UE prohibit state. In other cases, the processing unit 30 is adapted to start a prohibit timer to prohibit sending further UE failure indication messages during the prohibit timer. Optionally, the processing unit 30 is

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configured to reset the UE state when a RRC connection reconfiguration message is received from a base station.

Regardless of its implementation details, the UE 12 in one or more embodiments is configured to perform a method 600, operating in a network that supports dual connectivity operation, for minimizing transmission of unnecessary UE failure indications, such as shown in Figure 6. The method 600 includes detecting SCG failure for the UE, in response to detecting one of a plurality of SCG failure-triggering events (Block 610). These SCG failure-triggering events may include an expiration of an SCG change failure timer, an expiration of an SCG physical layer failure timer, an SCG RACH failure, an SCG MAC failure or an SCG RLC failure.

The method 600 also includes sending a UE failure indication message, in response to the detecting SCG failure (Block 620) and refraining from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled (Block 630).

In some cases, refraining from sending further UE failure messages comprises setting a state of the UE to a UE prohibit state, wherein sending further UE failure indication messages is prohibited while in the UE prohibit state (Block 640). An SCG PHY timer may also be prohibited from starting while in the UE prohibit state.

The UE state is reset in response to receiving an RRC connection reconfiguration message, according to further embodiments. This may include resetting the UE state in response to a RRC connection reconfiguration message reconfiguring SCG parameters to release or modify an SCG. The UE state can also be reset in response to a reconfiguration message to activate dual connectivity, a start of an SCG change failure timer, entering a connected state from an idle state, or determining that no answer to the UE failure indication was received.

In other cases, refraining from sending further UE failure messages comprises starting a prohibit timer, where sending further UE failure indication messages is prohibited during the prohibit timer (Block 650). An SCG physical layer failure timer may be prohibited from starting while in the UE prohibit state. The length of the prohibit timer may be set according to a predetermined length or a length that is received in a message, such as an RRC message.

The prohibit timer may expire or be stopped under certain circumstances. For example, the prohibit timer is stopped in response to receiving an RRC connection reconfiguration message or a dual connectivity reconfiguration message from another communication device. The prohibit timer may also be stopped in response to the RRC connection reconfiguration message reconfiguring SCG parameters to release or modify an SCG. In some cases, the prohibit timer is stopped in response to a first successful RRC configuration after SCG failure was

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detected. The prohibit timer may also be stopped in response to a start of an SCG change failure timer, determining that no answer to the UE failure indication was received, entering a connected state from an idle state, or a reconfiguration to activate dual connectivity.

In further embodiments, the method 600 may include sending another UE failure indication message upon expiration or stoppage of the prohibit timer. This may include resending the UE failure indication upon expiration or stoppage of the prohibit timer. Sending another UE failure indication message may also include sending a latest reported failure type instead of a failure type reported in the UE failure indication. Current measurement results may also be sent in the UE failure indication sent upon expiration or stoppage of the prohibit timer.

Some embodiments of the present invention are implemented by a radio network node, such as base station 10 exemplified in Figure 7. The base station 10 is arranged with radio circuitry 42 to communicate with served wireless devices such as the UE 12, communication circuitry 48 to communicate with other radio network and core network nodes, memory 46 to store information related to the embodiments, and a processing unit 40. The communication circuitry 48 is configured to receive and send from/to a core network node, such as a mobility management entity (MME), information and signaling related to embodiments described herein. The radio circuitry 42 is configured to receive messages, such as a UE failure indication message, from the UE 12 and send configuration messages.

The memory 46 is configured to store information related to embodiments described herein and includes any mix of storage circuits. The memory 46 may provide non-transitory storage for a computer program and configuration data. The processing unit 40 comprises appropriately configured processing circuitry, such as one or more microprocessors, microcontrollers, digital signal processors, and/or other digital logic, and is configured to process data and information signaled to and from the communication and radio circuitry 42, 48. The processing unit 40 is configured to receive a UE failure indication message indicating that the UE 12 is prohibited from sending UE failure indications in response to SCG failure-triggering events, and send a RRC connection reconfiguration message to indicate to the UE 12 that the UE 12 is reenabled to send UE failure indications in response to SCG failure-triggering events.

Regardless of its implementation details, the base station 10 in one or more embodiments is configured to perform a method 800, including receiving a UE failure indication message indicating that the UE 12 is prohibited from sending UE failure indications in response to SCG failure-triggering events (Block 810), and sending a message, such as an RRC connection reconfiguration message, to indicate to the UE 12 that the UE 12 is reenabled to send UE failure indications in response to SCG failure-triggering events (Block 820).

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In some cases, the method 800 may include sending a length of a prohibit timer in an RRC message to the UE 12, wherein the prohibit timer of the UE 12 prohibits sending of UE failure indications during the prohibit timer.

It should be understood that the methods illustrated in Figures 3-4, 6 and 8 are examples of the techniques described more fully above. Each of these methods may be modified according to any of the variations and details discussed. The methods illustrated in Figures 3-4, 6 and 8, and variants thereof, may be implemented using the processing units illustrated in Figures 5 and 7, as appropriate, where the processing units are processing circuits configured with appropriate program code stored in memory circuits, to carry out the operations described above. Embodiments of the presently disclosed techniques further include computer program products for application in a wireless terminal as well as corresponding computer program products for application in a base station apparatus or other network node apparatus. The program code or computer program instructions may also be stored in a non-transitory and tangible computer-readable medium.

It will be further appreciated that various aspects of the above-described embodiments can be understood as being carried out by functional "modules," which may be program instructions executing on an appropriate processor circuits, hard-coded digital circuitry and/or analog circuitry, or appropriate combinations thereof. For example, Figure 9 illustrates an example functional module or circuit architecture as may be implemented in a UE 12, e.g., based on the processing unit 30 and the memory 36, to operate the UE 12 in a network that supports dual connectivity operation for minimizing transmission of unnecessary UE failure indications. The illustrated embodiment at least functionally includes a detecting module 902 for detecting SCG failure for the UE 12, in response to detecting one of a plurality of SCG failure-triggering events. The implementation also includes a sending module 904 for sending a UE failure indication message, in response to the detecting SCG failure, and a refraining module 906 for refraining from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled.

In another example, Figure 10 illustrates an example functional module or circuit architecture as may be implemented in a base station 10, e.g., based on the processing unit 40 and the memory 46, to operate the base station 10 in a network that supports dual connectivity operation. The illustrated embodiment at least functionally includes a receiving module 1002 for receiving a UE failure indication message indicating that the UE 12 is prohibited from sending UE failure indications in response to SCG failure-triggering events, and a sending module 1004 for sending an RRC connection reconfiguration message to indicate to the UE 12 that the UE 12 is reenabled to send UE failure indications in response to SCG failure-triggering events.

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Thus, it is an object of embodiments herein to minimize unnecessary UE failure indications upon SCG failure detection in a wireless communication network. Advantages of the prohibit state and/or the prohibit timer of the embodiments include avoiding unexpected UE behavior and/or unnecessary transmissions. By avoiding such waste of radio resources, the system capacity will be increased.

Notably, modifications and other embodiments of the disclosed invention(s) will come to mind to one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention(s) is/are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of this disclosure. Although specific terms may be employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

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CLAIMS

What is claimed is:

1. A method (600), in a user equipment, UE (12), operating in a network that supports dual connectivity operation, for minimizing transmission of unnecessary UE failure indications, comprising:

detecting (610) secondary cell group, SCG, failure for the UE (12), in response to detecting one of a plurality of SCG failure-triggering events;

sending (620) a UE failure indication message, in response to the detected SCG failure; and

refraining (630) from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled.

2. The method (600) of claim 1, wherein the detected SCG failure-triggering event is one of:

an expiration of an SCG change failure timer;

an expiration of an SCG physical layer failure timer;

an SCG random access channel, RACH, failure;

an SCG medium access control, MAC, failure; and

an SCG radio link control, RLC, failure.

3. The method (600) of claim 1 or 2, wherein refraining (630) from sending further UE failure messages comprises setting (640) a state of the UE to a UE prohibit state, wherein sending further UE failure indication messages is prohibited while in the UE prohibit state.

4. The method (600) of claim 3, further comprising prohibiting an SCG physical layer failure timer from starting while in the UE prohibit state.

5. The method (600) of claim 3 or 4, further comprising resetting the UE state in response to receiving a radio resource control, RRC, connection reconfiguration message.

6. The method (600) of claim 5, further comprising resetting the UE state in response to the RRC connection reconfiguration message reconfiguring SCG parameters to release or modify an SCG.

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7. The method (600) of claim 3 or 4, further comprising resetting the UE state in response to a reconfiguration message to activate dual connectivity.

8. The method (600) of claim 3 or 4, further comprising resetting the UE state in response to a start of an SCG change failure timer.

9. The method (600) of claim 3 or 4, further comprising resetting the UE state in response to entering a connected state from an idle state.

10. The method (600) of claim 3 or 4, further comprising resetting the UE state in response to determining that no answer to the UE failure indication was received.

11. The method (600) of claim 1 or 2, wherein refraining (630) from sending further UE failure messages comprises starting (650) a prohibit timer, wherein sending further UE failure indication messages is prohibited during the prohibit timer.

12. The method (600) of claim 11, further comprising prohibiting an SCG physical layer failure timer from starting while in the UE state.

13. The method (600) of claim 11 or 12, further comprising stopping the prohibit timer in response to receiving a radio resource control, RRC, connection reconfiguration message from the other communication device.

14. The method (600) of claim 13, further comprising stopping the prohibit timer in response to the RRC connection reconfiguration message reconfiguring SCG parameters to release or modify an SCG.

15. The method (600) of claim 11 or 12, further comprising stopping the prohibit timer in response to a first successful radio resource control, RRC, configuration after SCG failure was detected.

16. The method (600) of claim 11 or 12, further comprising stopping the prohibit timer in response to a start of an SCG change failure timer.

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17. The method (600) of claim 11 or 12, further comprising stopping the prohibit timer in response to determining that no answer to the UE failure indication was received.

18. The method (600) of claim 11 or 12, further comprising stopping the prohibit timer in response to entering a connected state from an idle state.

19. The method (600) of claim 11 or 12, further comprising stopping the prohibit timer in response to a reconfiguration to activate dual connectivity.

20. The method (600) of any of claims 11-19, further comprising sending another UE failure indication message upon expiration or stoppage of the prohibit timer.

21. The method (600) of claim 20, wherein sending another UE failure indication message comprises resending the UE failure indication upon expiration or stoppage of the prohibit timer.

22. The method (600) of claim 20, wherein sending another UE failure indication message comprises sending a latest reported failure type instead of a failure type reported in the UE failure indication.

23. The method (600) of any of claims 20-22, further comprising including current measurement results in the UE failure indication sent upon expiration or stoppage of the prohibit timer.

24. The method (600) of any of claims 11-23, further comprising:
receiving a length of the prohibit timer in a radio resource control, RRC, message; and
setting the prohibit timer according to the received length.

25. A user equipment, UE (12), comprising radio circuitry (32) adapted to communicate messages within a wireless network and further comprising a processing unit (30) adapted to carry out the method (600) of any of claims 1-24.

26. A user equipment, UE (12), adapted to
detect secondary cell group, SCG, failure for the UE (12), in response to detecting one of a plurality of SCG failure-triggering events;
send a UE failure indication message, in response to the detecting SCG failure; and

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refrain from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled.

27. A user equipment, UE (12), comprising:

a detecting module (902) for detecting secondary cell group, SCG, failure for the UE (12), in response to detecting one of a plurality of SCG failure-triggering events;

a sending module (904) for sending a UE failure indication message, in response to the detecting SCG failure; and

a refraining module (906) for refraining from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled.

28. A computer program product comprising program instructions for a processing unit in a user equipment, UE (12), wherein the program instructions are configured so as to cause the UE (12) when the program instructions are executed by the processing unit (30) to:

detect secondary cell group, SCG, failure for the UE (12), in response to detecting one of a plurality of SCG failure-triggering events;

send a UE failure indication message, in response to the detecting SCG failure; and

refrain from sending further UE failure indication messages in response to SCG failure-triggering events, until the sending of further UE failure indication messages is reenabled.

29. A non-transitory computer-readable medium (36) comprising, stored thereupon, the computer program product of claim 28.

30. A method (800), in a network node (10), for minimizing transmission of unnecessary user equipment, UE, failure indications from a UE (12), comprising:

receiving (810) a UE failure indication message indicating that the UE (12) is prohibited from sending UE failure indications in response to SCG failure-triggering events; and

sending (820) a radio resource control, RRC, connection reconfiguration message to indicate to the UE (12) that the UE (12) is reenabled to send UE failure indications in response to SCG failure-triggering events.

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31. The method (800) of claim 30, further comprising sending a length of a prohibit timer in a radio resource control, RRC, message to the UE (12), wherein the prohibit timer of the UE (12) prohibits sending of UE failure indications during the prohibit timer.

32. A network node (10) comprising radio circuitry (42) adapted to communicate messages within a wireless network and further comprising a processing unit (40) adapted to carry out the method (800) of claim 30 or 31.

33. A network node (10) adapted to

receive a user equipment, UE, failure indication message indicating that a UE (12) is prohibited from sending UE failure indications in response to SCG failure-triggering events; and

send a radio resource control, RRC, connection reconfiguration message to indicate to the UE (12) that the UE (12) is reenabled to send UE failure indications in response to SCG failure-triggering events.

34. A network node (10), comprising:

a receiving module (1002) for receiving a user equipment, UE, failure indication message indicating that a UE (12) is prohibited from sending UE failure indications in response to SCG failure-triggering events; and

a sending module (1004) for sending a radio resource control, RRC, connection reconfiguration message to indicate to the UE (12) that the UE (12) is reenabled to send UE failure indications in response to SCG failure-triggering events.

35. A computer program product comprising program instructions for a processing unit (40) in a network node (10), wherein the program instructions are configured so as to cause the network node (10) when the program instructions are executed by the processing unit (40) to:

receive a user equipment, UE (12), failure indication message indicating that the UE (12) is prohibited from sending UE failure indications in response to SCG failure-triggering events; and

send a radio resource control, RRC, connection reconfiguration message to indicate to the UE (12) that the UE (12) is reenabled to send UE failure indications in response to SCG failure-triggering events.

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36. A non-transitory computer-readable medium (46) comprising, stored thereupon, the computer program product of claim 35.

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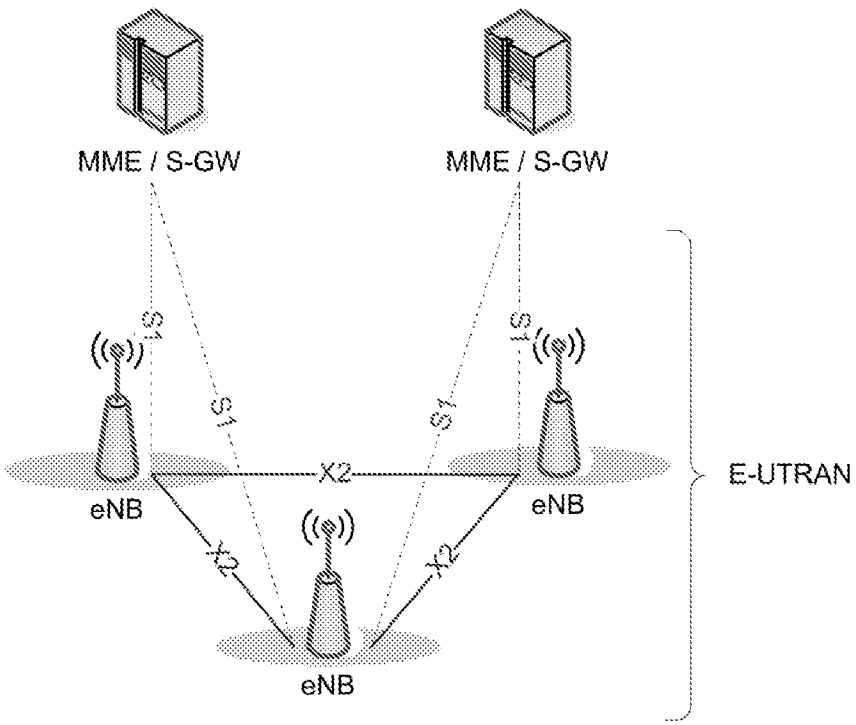


FIG. 1

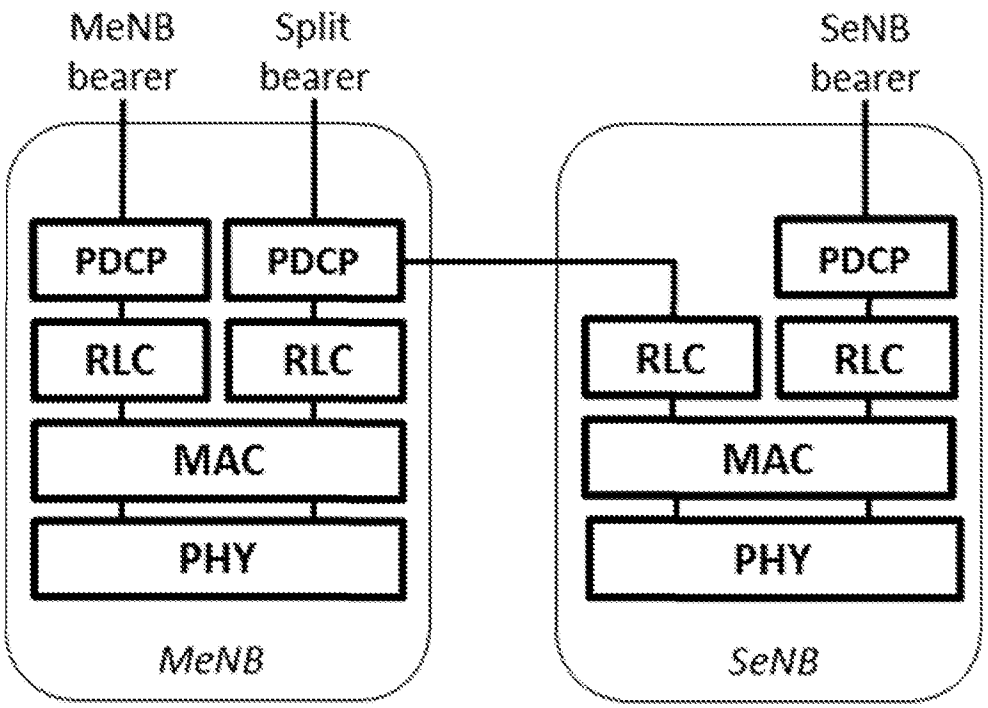

MeNB bearer
Split bearer
SeNB bearer
PDCP
PDCP
PDCP
RLC
RLC
RLC
RLC
MAC
MAC
PHY
PHY
MeNB
SeNB

FIG. 2

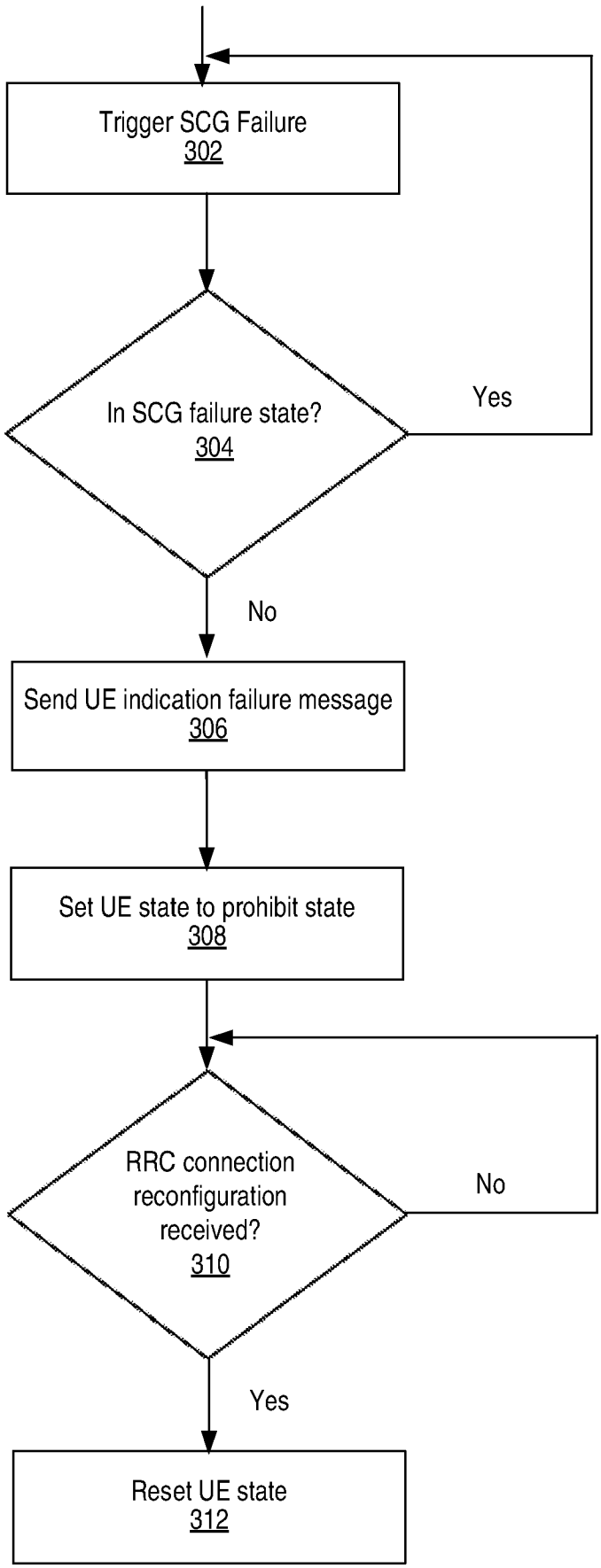

Trigger SCG Failure
302
In SCG failure state?
304
Yes
No
Send UE indication failure message
306
Set UE state to prohibit state
308
RRC connection reconfiguration received?
310
No
Yes
Reset UE state
312

FIG. 3

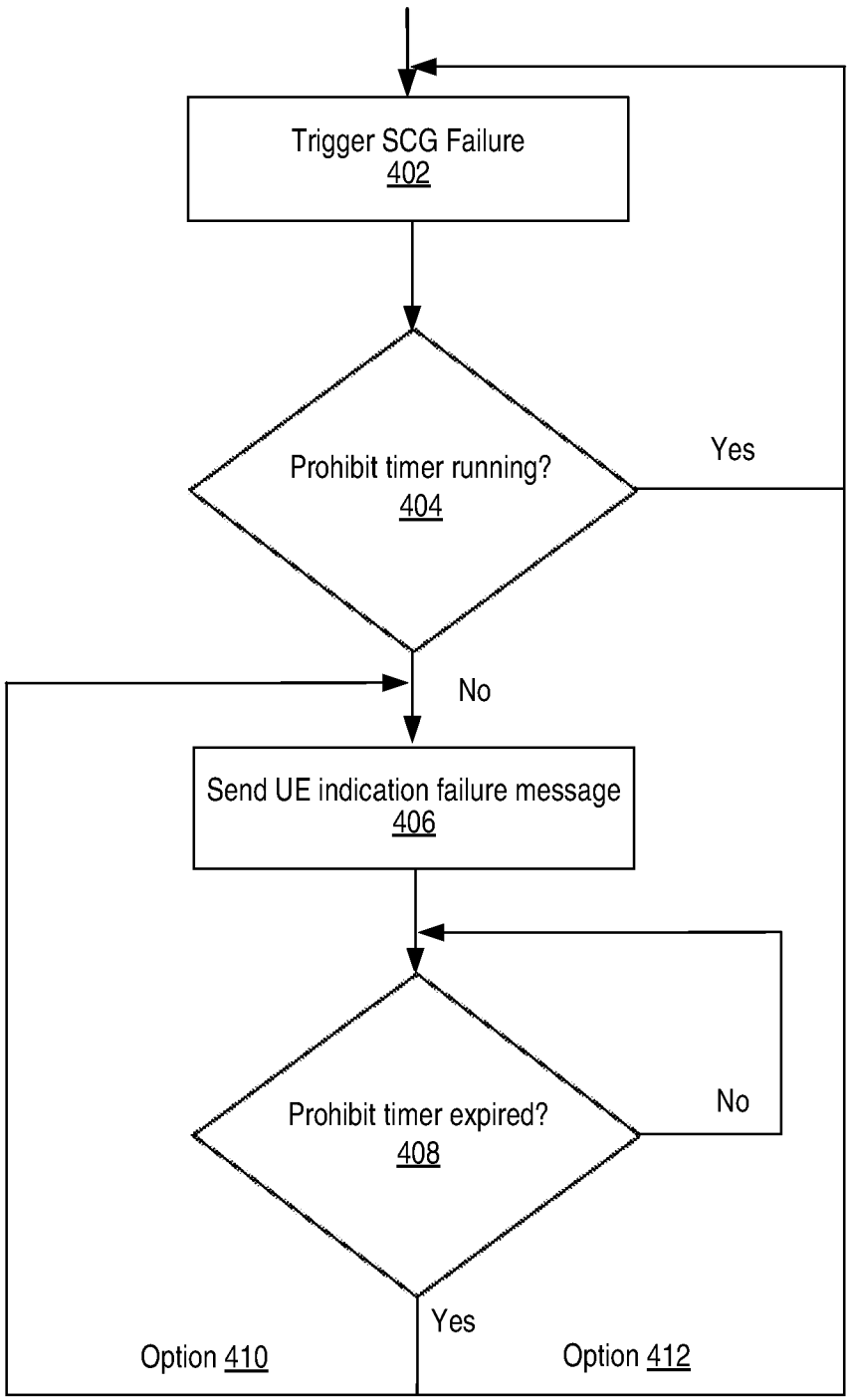

Trigger SCG Failure
402
Prohibit timer running?
404
Yes
No
Send UE indication failure message
406
Prohibit timer expired?
408
No
Yes
Option 410
Option 412

FIG. 4

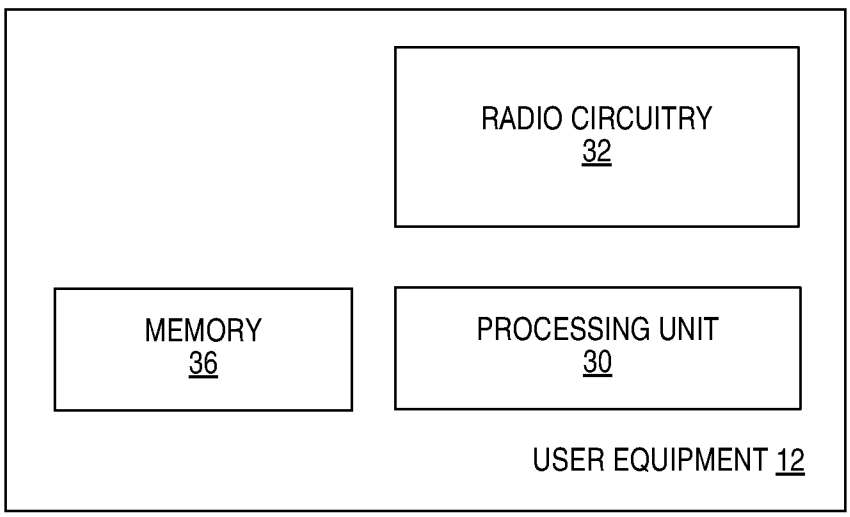

RADIO CIRCUITRY
32
MEMORY
36
PROCESSING UNIT
30
USER EQUIPMENT 12

FIG. 5

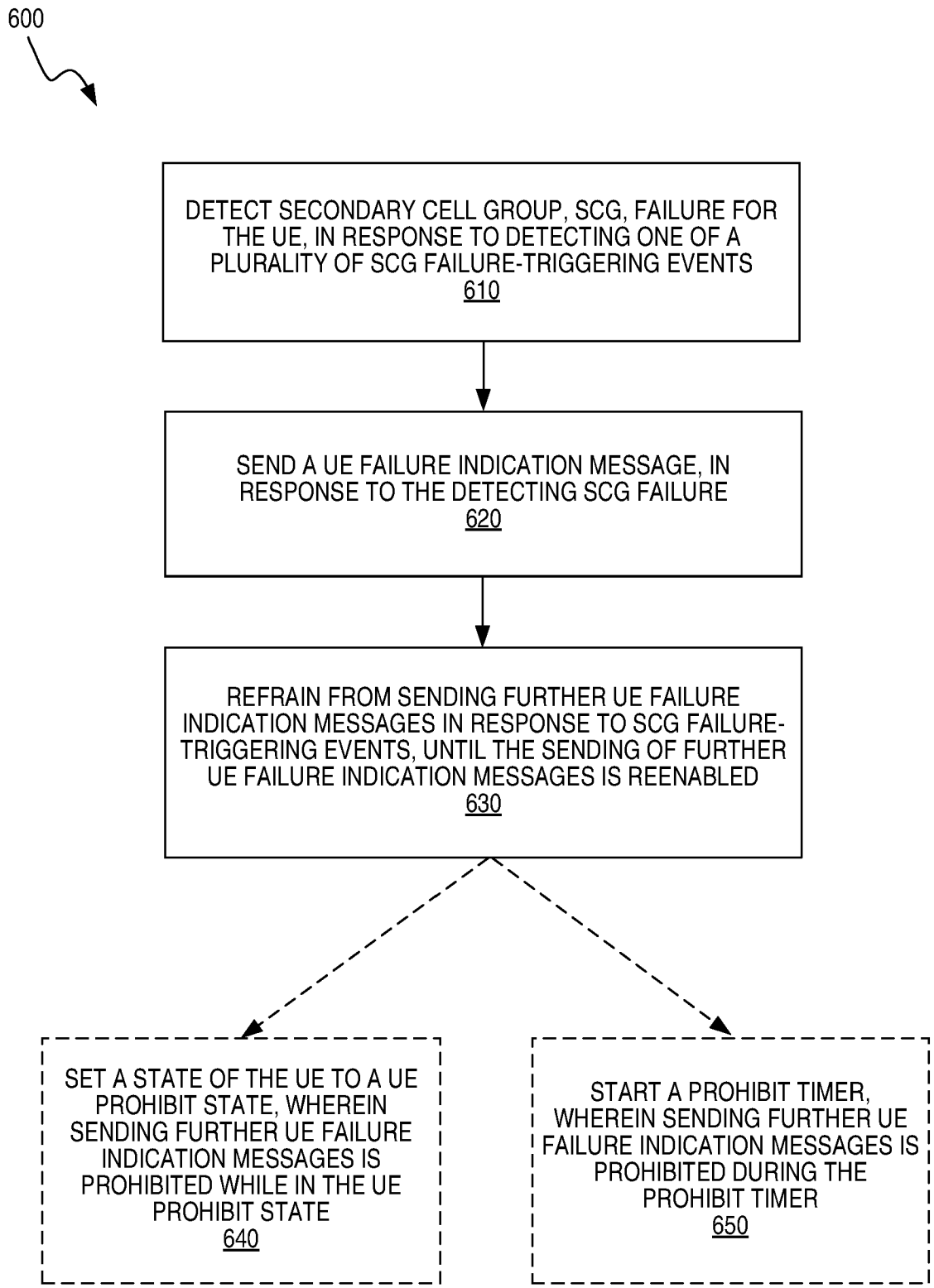

600
DETECT SECONDARY CELL GROUP, SCG, FAILURE FOR THE UE, IN RESPONSE TO DETECTING ONE OF A PLURALITY OF SCG FAILURE-TRIGGERING EVENTS
610
SEND A UE FAILURE INDICATION MESSAGE, IN RESPONSE TO THE DETECTING SCG FAILURE
620
REFRAIN FROM SENDING FURTHER UE FAILURE INDICATION MESSAGES IN RESPONSE TO SCG FAILURE-TRIGGERING EVENTS, UNTIL THE SENDING OF FURTHER UE FAILURE INDICATION MESSAGES IS REENABLED
630
SET A STATE OF THE UE TO A UE PROHIBIT STATE, WHEREIN SENDING FURTHER UE FAILURE INDICATION MESSAGES IS PROHIBITED WHILE IN THE UE PROHIBIT STATE
640
START A PROHIBIT TIMER, WHEREIN SENDING FURTHER UE FAILURE INDICATION MESSAGES IS PROHIBITED DURING THE PROHIBIT TIMER
650

FIG. 6

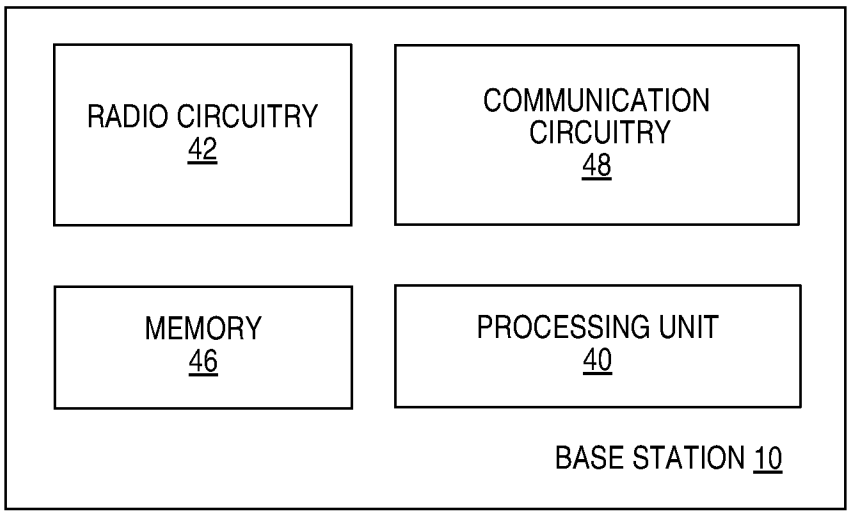

RADIO CIRCUITRY
42
COMMUNICATION
CIRCUITRY
48
MEMORY
46
PROCESSING UNIT
40
BASE STATION 10

FIG. 7

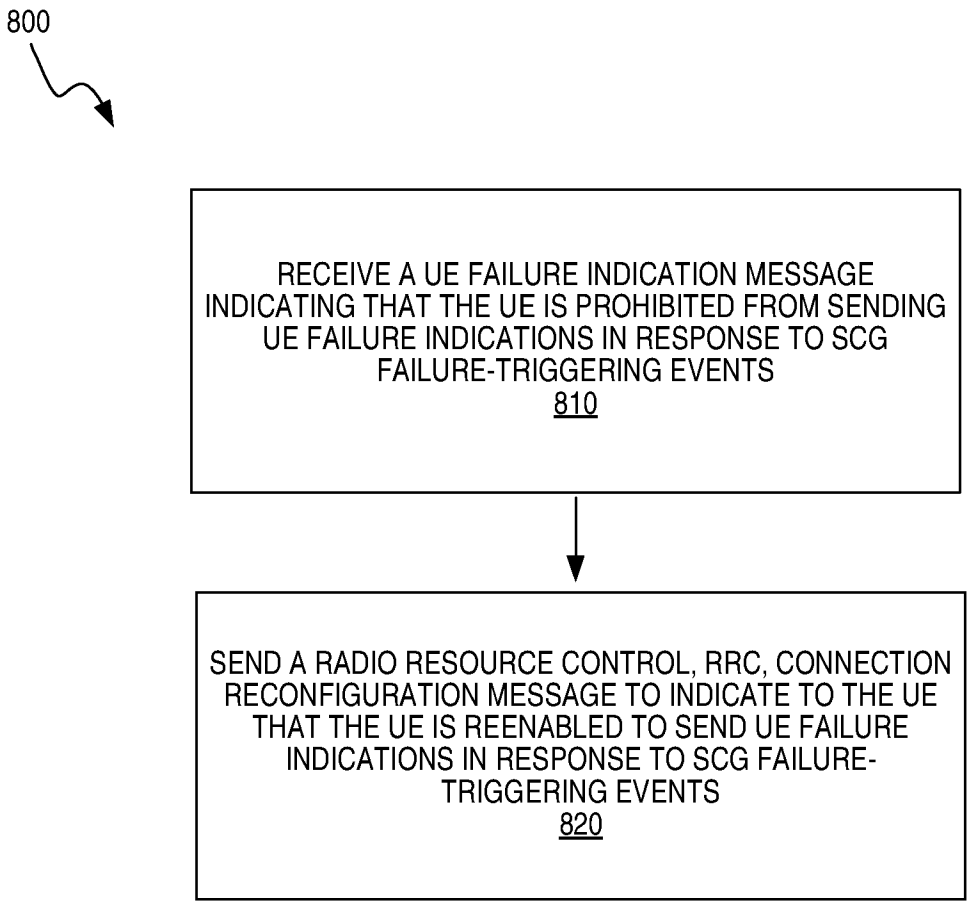

800
RECEIVE A UE FAILURE INDICATION MESSAGE INDICATING THAT THE UE IS PROHIBITED FROM SENDING UE FAILURE INDICATIONS IN RESPONSE TO SCG FAILURE-TRIGGERING EVENTS
810
SEND A RADIO RESOURCE CONTROL, RRC, CONNECTION RECONFIGURATION MESSAGE TO INDICATE TO THE UE THAT THE UE IS REENABLED TO SEND UE FAILURE INDICATIONS IN RESPONSE TO SCG FAILURE-TRIGGERING EVENTS
820

FIG. 8

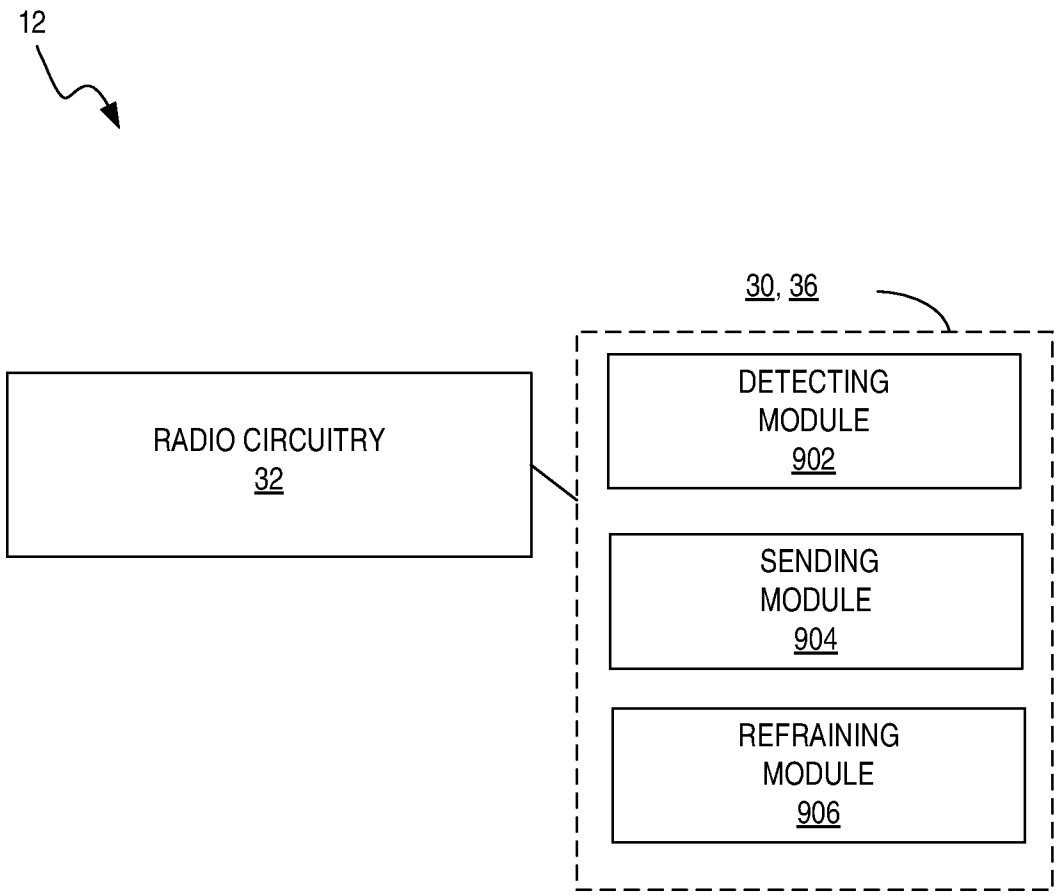

12
30, 36
RADIO CIRCUITRY
32
DETECTING
MODULE
902
SENDING
MODULE
904
REFRAINING
MODULE
906

FIG. 9

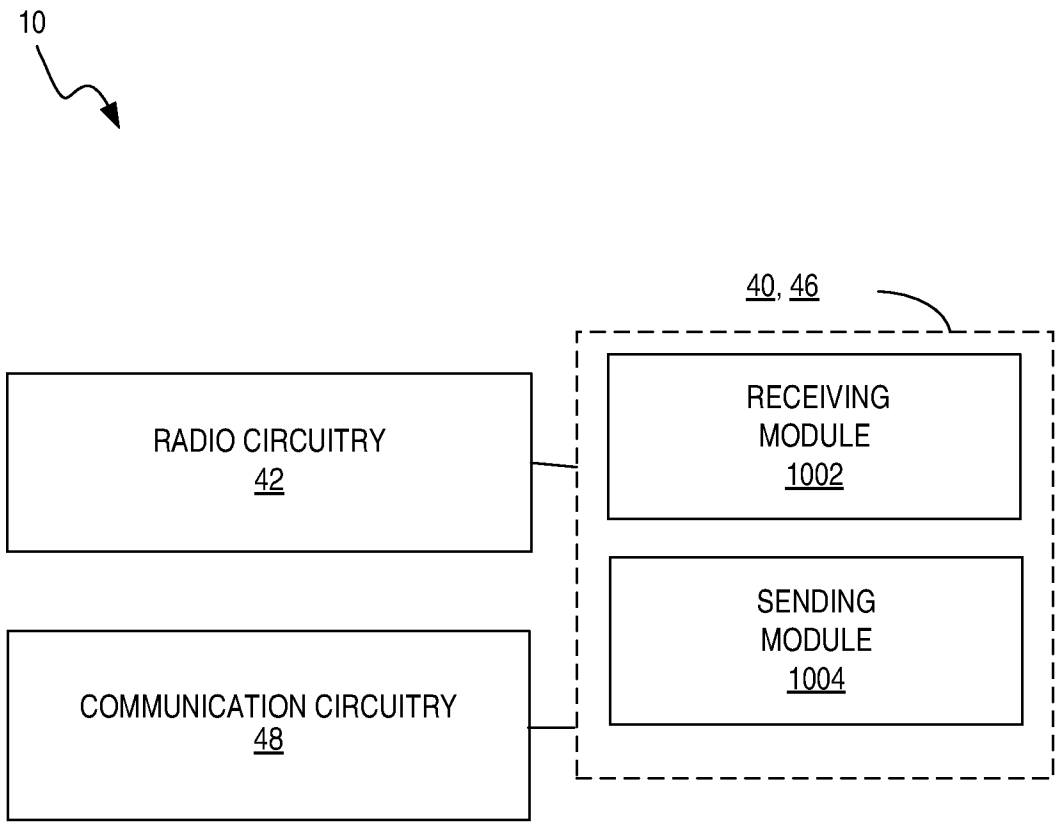

10
40, 46
RADIO CIRCUITRY
42
COMMUNICATION CIRCUITRY
48
RECEIVING
MODULE
1002
SENDING
MODULE
1004

FIG. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/SE2015/051109

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04W76/02
ADD.

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

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)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X,P	ERICSSON: "SCG failure prohibit", 3GPP DRAFT; R2-145008 - SCG FAILURE PROHIBIT, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , vol. RAN WG2, no. San Francisco, USA; 20141117 - 20141121 7 November 2014 (2014-11-07), XP050886512, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_88/Docs/ [retrieved on 2014-11-07] the whole document ----- -/--	1,20,23, 25-29, 33-36

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"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	Date of mailing of the international search report
29 January 2016	10/02/2016

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Rothlübbers, C

1

Form PCT/ISA/210 (second sheet) (April 2005)

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INTERNATIONAL SEARCH REPORT

International application No
PCT/SE2015/051109

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	US 2015/223282 A1 (VAJAPEYAM MADHAVAN SRINIVASAN [US] ET AL) 6 August 2015 (2015-08-06) paragraph [0002] paragraph [0005] - paragraph [0007] paragraph [0026] - paragraph [0028] paragraph [0054] paragraph [0076] - paragraph [0086] -----	1-36
A	NEC: "Remaining issues in S-RLF", 3GPP DRAFT; R2-142411_REMAINING ISSUES IN S-RLF, 3RD GENERATION PARTNERSHIP PROJECT (3GPP), MOBILE COMPETENCE CENTRE ; 650, ROUTE DES LUCIOLES ; F-06921 SOPHIA-ANTIPOLIS CEDEX ; FRANCE , vol. RAN WG2, no. Seoul, South Korea; 20140519 - 20140523 9 May 2014 (2014-05-09), XP050818485, Retrieved from the Internet: URL:http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_86/Docs/ [retrieved on 2014-05-09] the whole document -----	1-36

1

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DAINGEAN_0004462

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/SE2015/051109

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2015223282 A1	06-08-2015	US 2015223282 A1	06-08-2015
		WO 2015116877 A1	06-08-2015

TRANSLATION

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2018/099379

A. CLASSIFICATION OF SUBJECT MATTER

H04W 24/02(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

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)

CNPAT; CNKI; WPI; EPODOC; 3GPP: 主小区, 辅小区, 次小区, 主载波, 辅载波, 群, 集合, 信令, 无线承载, 重复, 复制, 失效, 无效, 故障, 错, MCG, SCG, SRB, duplicated, repeat, failure, invalidation, uplink, report

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	NOKIA et al. "Further Considerations for SCG SRB and RLF Handling" *3GPP TSG-RAN WG2 NR Adhoc #2 R2-1706857*, 29 June 2017 (2017-06-29), main body, sections 1-2	1-10
A	ZTE. "Configuration of SCG SRB and Split & Duplicated SRB" *3GPP TSG-RAN WG3#Ad-hoc R3-172053*, 29 June 2017 (2017-06-29), entire document	1-10
A	CN 105684496 A (LG ELECTRONICS INC.) 15 June 2016 (2016-06-15) entire document	1-10
A	WO 2016064334 A1 (TELEFONAKTIEBOLAGET L M ERICSSONPUBL) 28 April 2016 (2016-04-28) entire document	1-10

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"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	Date of mailing of the international search report
12 October 2018	**29 October 2018**
Name and mailing address of the ISA/CN **State Intellectual Property Office of the P. R. China** **No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088** **China** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (January 2015)

DAINGEAN_0004464

TRANSLATION

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2018/099379

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	105684496	A	15 June 2016	US	2018070259	A1	08 March 2018
				WO	2015060543	A1	30 April 2015
				KR	20160073962	A	27 June 2016
				US	2016242064	A1	18 August 2016
WO	2016064334	A1	28 April 2016	AU	2015337123	A1	04 May 2017
				EP	3210430	A1	30 August 2017
				US	2016302256	A1	13 October 2016
				RU	2661538	C1	17 July 2018
				US	2018184482	A1	28 June 2018
				BR	112017008031	A2	23 January 2018
				JP	2017531961	A	26 October 2017
				CN	107079514	A	18 August 2017

Form PCT/ISA/210 (patent family annex) (January 2015)

DAINGEAN_0004465

PATENT COOPERATION TREATY

TRANSLATION

From the INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

	Date of mailing *(day/month/year)* **29 October 2018**
Applicant's or agent's file reference **IP180226**	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/CN2018/099379	**08 August 2018**	**10 August 2017**

International Patent Classification (IPC) or both national classification and IPC
H04W 24/02(2009.01)i

Applicant
SHARP KABUSHIKI KAISHA

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/	Date of completion of this opinion	Authorized officer

Form PCT/ISA/237 (Cover sheet) (January 2015)

DAINGEAN_0004466

TRANSLATION

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/CN2018/099379

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
   - [x] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).

3. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
   - a. [ ] forming part of the international application as filed:
     - [ ] in the form of an Annex C/ST.25 text file.
     - [ ] on paper or in the form of an image file.
   - b. [ ] furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
   - c. [ ] furnished subsequent to the international filing date for the purposes of international search only:
     - [ ] in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
     - [ ] on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

TRANSLATION

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/CN2018/099379

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	1-10	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-10	NO
Industrial applicability (IA)	Claims	1-10	YES
	Claims	None	NO

2. Citations and explanations :

[1] 1. Reference is made to the following document:

[2] D1: Further Considerations for SCG SRB and RLF Handling, 3GPP TSG-RAN WG2 NR Adhoc #2 R2-1706857 (29 June 2017)

[3] 2. Novelty and inventive step:

[4] D1 discloses further considerations for SCG SRB and RLF handling (see the text, and sections 1 and 2), and specifically discloses that: a user equipment (UE) can be configured with both split MCG SRB and SCG SRB simultaneously. In LTE-NR DC, following SgNB failure cases are supported: SgNB RLF, exceeding the maximum uplink transmission timing difference, SgNB configuration failure, and the like; the UE reports the SCG Failure Information to the MeNB (corresponding to detecting that a SCG fails). Upon SgNB failures, UE shall performing processing, such as suspending direct SCG SRB, suspending SCG transmission for MCG split SRB, and reseting SCG-MAC. Proposal: The UE may continue using the MN leg in DL and UL upon SCG failure.

[5] Claim 1 differs from D1 in that: an MCG duplication SRB performs uplink transmission by means of an SCG, and after the SCG fails, is configured to perform transmission by means of an MCG or trigger the failure of the MCG. Therefore, claims 1-4 comply with PCT Article 33(2). However, packet duplication and a packet duplication split bearer are common transmission modes in the art for SRB transmission, and configuring that unlink transmission of MCG duplication transmission uses the MCG and the SCG for transmission is a specific conventional option of a person skilled in the art. On the basis of the content disclosed in D1, after the SCG fails, information of packet duplication transmission continues to be transmitted by means of the MCG or the failure of the MCG is triggered; this is a specific conventional setting that would be easily conceived of by a person skilled in the art. Therefore, claim 1 does not comply with PCT Article 33(3).

[6] The additional features of claims 2-4 are disclosed by D1 or are common technical means in the art. Therefore, claims 2-4 do not comply with PCT Article 33(3).

[7] Claim 5 sets forth a UE, for implementing the method according to any one of claims 1-4. On the basis of the comments on claims 1-4 above, because a transceiver, a processor, and a memory comprised in claim 5 are all common devices in the art, claim 5 complies with PCT Article 33(2), but does not comply with PCT Article 33(3).

[8] Claim 6 differs from D1 in that: an MCG base station communicates with the UE by means of the MCG duplication SRB, and the SRB performs uplink transmission by means of the SCG, and after the SCG fails, is configured to receive uplink transmission by means of the MCG. Therefore, claims 6-9 comply with PCT Article 33(2). However, packet duplication and a packet duplication split bearer are common transmission modes in the art for SRB transmission, and configuring that unlink transmission of MCG duplication transmission uses the MCG and the SCG for transmission is a specific conventional option of a person skilled in the art. On the basis of the content disclosed in D1, after the SCG fails, information of packet duplication transmission continues to be transmitted by means of the MCG; this is a specific conventional setting that would be easily conceived of by a person skilled in the art. Therefore, claim 6 does not comply with PCT Article 33(3).

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

[9] The additional features of claims 7-9 are disclosed by D1 or are common technical means in the art. Therefore, claims 7-9 do not comply with PCT Article 33(3).

[10] Claim 10 sets forth a base station, for implementing the method according to any one of claims 6-9. On the basis of the comments on claims 6-9 above, because a transceiver, a processor, and a memory comprised in claim 10 are all common devices in the art, claim 10 complies with PCT Article 33(2), but does not comply with PCT Article 33(3).

[11] 3. Industrial applicability:

[12] Claims 1-10 comply with PCT Article 33(4).

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ALLEMAGNE

Date
01.04.21

Reference	Application No./Patent No.
69605	18844831.0 - 1215 / 3668152 PCT/CN2018099379
Applicant/Proprietor	
Sharp Kabushiki Kaisha, et al	

Communication

The extended European search report is enclosed.

The extended European search report includes, pursuant to Rule 62 EPC, the supplementary European search report (Art. 153(7) 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.

Refund of the 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 shortly (R. 70(2) EPC).

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SUPPLEMENTARY EUROPEAN SEARCH REPORT

Application Number
EP 18 84 4831

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 Y	US 2016/192249 A1 (WU CHIH-HSIANG [TW]) 30 June 2016 (2016-06-30) * paragraph [0019] * * claims 1, 2 * * paragraph [0029] * * paragraph [0031] * * paragraph [0032] *	1,5,6,10 2-4,7-9	INV. H04W24/02
Y	US 2016/212753 A1 (WU CHIH-HSIANG [TW]) 21 July 2016 (2016-07-21) * paragraph [0033] * * paragraph [0034] *	2-4,7-9	
A	US 2016/302256 A1 (SUSITAIVAL RIIKKA [FI] ET AL) 13 October 2016 (2016-10-13) * paragraph [0011] - paragraph [0016] *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)

H04W

The supplementary search report has been based on the last set of claims valid and available at the start of the search.

Place of search	Date of completion of the search	Examiner
The Hague	24 March 2021	Gregori, Stefano

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

EPO FORM 1503 03.82 (P04C04)

DAINGEAN_0004471

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 18 84 4831

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.

24-03-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2016192249 A1	30-06-2016	CN 105744626 A	06-07-2016
		EP 3048854 A1	27-07-2016
		TW 201625036 A	01-07-2016
		US 2016192249 A1	30-06-2016
US 2016212753 A1	21-07-2016	CN 105813121 A	27-07-2016
		EP 3051916 A1	03-08-2016
		TW 201628452 A	01-08-2016
		US 2016212753 A1	21-07-2016
US 2016302256 A1	13-10-2016	AU 2015337123 A1	04-05-2017
		BR 112017008031 A2	23-01-2018
		CN 107079514 A	18-08-2017
		CN 111867151 A	30-10-2020
		DK 3210430 T3	14-12-2020
		EP 3210430 A1	30-08-2017
		EP 3793323 A1	17-03-2021
		JP 6401390 B2	10-10-2018
		JP 2017531961 A	26-10-2017
		PT 3210430 T	04-01-2021
		RU 2661538 C1	17-07-2018
		US 2016302256 A1	13-10-2016
		US 2018184482 A1	28-06-2018
		US 2019215891 A1	11-07-2019
		US 2020413473 A1	31-12-2020
		WO 2016064334 A1	28-04-2016

Information on Search Strategy - Pilot phase (see OJ 2015, A86)
The type of information contained in this sheet may change during the pilot for improving the usefulness of this new service.

Application Number
EP 18 84 4831

TITLE: USER EQUIPMENT, BASE STATION, AND RELATED METHOD

APPLICANT: Sharp Kabushiki Kaisha

IPC CLASSIFICATION: H04W24/02

EXAMINER: Gregori, Stefano

CONSULTED DATABASES: EPODOC, DOSYS

CLASSIFICATION SYMBOLS DEFINING EXTENT OF THE SEARCH:

IPC:

CPC:

FI/F-TERMS:

KEYWORDS OR OTHER ELEMENTS FEATURING THE INVENTION:
Master Cell Group, MCG, Seconday Cell Group, SCG, SCG failure, duplicat+, SRB, reconfigur+ SRB

EPO FORM P04A42

DAINGEAN_0004473

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

Description, Pages

1-23 filed with entry into the regional phase before the EPO

Claims, Numbers

1-10 filed with entry into the regional phase before the EPO

Drawings, Sheets

1/6-6/6 filed with entry into the regional phase before the EPO

Reference is made to the following documents; the numbering will be adhered to in the rest of the procedure.

D1 US 2016/192249 A1 (WU CHIH-HSIANG [TW]) 30 June 2016 (2016-06-30)

D2 US 2016/212753 A1 (WU CHIH-HSIANG [TW]) 21 July 2016 (2016-07-21)

D3 US 2016/302256 A1 (SUSITAIVAL RIIKKA [FI] ET AL) 13 October 2016 (2016-10-13)

1. Clarity

The application does not meet the requirements of Article 84 EPC, because claims 1, 5, 6 and 10 are not clear.

1.1 The term in claims 1 and 6 "MCG duplicated Signaling Radio Bearer" has no well known meaning for the person skilled in the art and it should be defined in the claims as it is defined in te description at page 9 lines 15-17.

1.2 The sentence in claims 1 and 6 "reconfiguring the MCG duplicated SRB to be used for uplink transmission via the MCG" to determine how the SRB is reconfigured and it should be defined in the claims as it is defined in the description at page 13 lines 27-32.

1.3 The sentence in claims 5 and 10 "the processor storing instructions executable by the processor to cause the base station to perform the method" tries to define an apparatus with method steps and it should be rephrased "the processors adapted to perform the method...".

2. **Novelty**

Furthermore, notwithstanding the above-mentioned lack of clarity, the subject-matter of claims 1, 5, 6 and 10 is not new within the meaning of Article 54(1) and (2) EPC, and the requirements of Article 52(1) EPC are therefore not met.

2.1 Claim 1

Document D1 discloses (the references being the one in D1):

a method used in User Equipment, UE, the UE being configured with a Master Cell Group (see § 19) , MCG duplicated Signaling Radio Bearer, SRB, the MCG duplicated SRB being associated with an MCG and a Secondary Cell Group (see claims 1 and 2), SCG and configured to be used for uplink transmission via the SCG, and the method comprising: detecting an SCG failure (see § 29) ; and reconfiguring the MCG duplicated SRB to be used for uplink transmission via the MCG, or triggering an MCG failure(see § 31).

2.2 Claim 5 defines the UE corresponding to the the method of claim 1 and it is therefore also not new.

2.3 Claim 6

Document D1 discloses (the references being the one in D1):

a method used in a base station, the base station being a Master Cell Group, MCG base station and communicating with User Equipment, UE over an MCG (see § 19) duplicated Signaling Radio Bearer, SRB, the MCG duplicated SRB being associated with the MCG and a Secondary Cell Group, SCG and configured to be used for uplink transmission via the SCG (see §31), and the method comprising: receiving from the UE a report on an SCG failure (see § 2); and reconfiguring the MCG duplicated SRB to receive uplink transmission via the MCG (see § 32) .

2.4 Claim 10 defines the base station corresponding to the method of claim 6 and it is therefore also not new.

3. Dependent claims

The additional features defined in claims 2-4 and 7-9 are also not inventive (Art. 56 EPC) because they are disclosed in D2.

Claims 2 and 8 see D2 § 33.

Claims 3, 4, 7 and 9 see D2 § 34.

It would be obvious for the person skilled in the art to combine the teaching of D2 to D1 because they both disclose a method for detecting SCG failures.

4. Procedural Aspects

4.1 It is not at present apparent which part of the application could serve as a basis for a new, allowable claim. Should the applicant nevertheless regard some particular matter as patentable, an independent claim should be filed taking account of Rule 43(1,2) EPC.

4.2 The applicant is requested to indicate in the letter of reply the difference of the subject-matter of the new claim vis-a-vis the state of the art and the significance thereof.

4.3 Reference signs in parentheses should be inserted in the claims to increase their intelligibility, Rule 43(7) EPC. If the two part form of claim is used this applies to both the preamble and characterising portion.

4.4 The applicant should amend the description as needed to fulfil the following requirements:

- The technical field of the invention (Rule 42(1)(a), GL F-II.4.2) must correspond to the amended set of claims.
- The summary of the invention (Rule 42(1)(c) and GL F-II.4.5) must correspond to the amended set of claims. If appropriate, statements such as "The invention is set out in the appended set of claims" or "The invention is as defined in claim X" can be applied instead of repeating the claims verbatim.
- All embodiments which are not covered by the claims anymore must be deleted, unless these embodiments can reasonably be considered to be useful for highlighting specific aspects of the amended subject-matter. In such case, they must be prominently marked as not being part of the present invention (T 1808/06).

- Subject-matter in the description being excluded from patentability under Article 53 EPC needs to be excised, reworded such that it does not fall under the exceptions to patentability or prominently marked as not being according to the claimed invention.
- All technical features of the independent claims shall not be presented as optional in the description. Terms such as "for example", "may", "can", "exemplary", "optionally", "preferably" and the like should be removed when preceding a feature of an independent claim.
- Claim-like clauses must be deleted prior to grant. The term "claim-like clauses" means clauses present in the description which use claim language such as "according to the preceding clause", "characterised in that", ... (GL F IV, 4.4). These "claim-like clauses" also include examples, embodiments or aspects presented as claim-like clauses. A simple conversion of these clauses into separate optional features will not be admitted, either.
- To meet the requirements of Rule 42(1)(b) EPC, the document D1 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.

4.5 In filing any new documents, the applicant is kindly reminded that Art. 123(2) EPC requires that such subject matter thereof may not extend beyond that which was originally filed. In order to make examination more efficient the examiner requests the applicant to indicate in the letter of reply where there is a basis for any amendments in the application as originally filed. It may be appropriate to do this by including marked up copies of the amended pages.

3GPP TSG RAN WG3#Ad-hoc **R3-172053**
Qingdao, China, 27th – 29th June 2017 **(Revision of R3-171556)**

Agenda item: 10.8.1

Source: ZTE

Title: Configuration of SCG SRB and Split&Duplicated SRB

Document for: Discussion and Approval

1. Introduction

In RAN2#97bis, it has been agreed that

- Addition of SCG SRB is decided by SN.
- FFS Whether the MN can request establishment of SCG SRB.
- SCG SRB configuration is provided by NR RRC from SN.
- Split SRB should be decided and configured by MN in SeNB addition and/or Modification procedure, with SN configuration part provided by SN. (RAN3 can discuss whether there are cases where the SN may need to reject the split SRB configuration).
- SCG SRB cannot be split.

In RAN2#98, it has been further agreed that

- SCG SRB is modelled as one of the NR SRBs defined in 38.331.
- SCG SRB uses NR-DCCH logical channel type.
- A UE can be configured with both split MCG SRB and SCG SRB simultaneously.
- SCG SRB and the **SCG leg** of split SRB1/2 will be independently configured.
- SCG-SRB establishment and release can be done at **SCG addition** and SN change
- SCG-SRB reconfiguration can be done at **SCG modification** procedure.
- RRC PDUs on SCG-SRB are ciphered using NR PDCP.
- RRC PDUs on SCG-SRB are integrity protected using NR PDCP.
- Security keys for SCG-SRB are derived from S-KgNB.

In this contribution, we shall continue analyzing those impacts on X2/Xn MR-DC specific procedures and make proceeding proposals.

2. Discussion

SCG SRB is a new feature in MR-DC context, which serves following purpose:
(1) Helps to covey SCG RRC PDUs directly to/from UE, in order to reduce signalling transmission latency.
The configuration of SCG SRB involves a full radio protocol stack on SN side (PDCP/RLC/MAC/PHY), which is generated by SN and totally transparent to MN, i.e. MN may not even know whether SCG SRB is configured or not.

MCG Split SRB /Duplication is also a new feature in MR-DC context, which serves following different purpose:
(2) Helps to covey MCG RRC PDCP PDUs either in split (No RRC Diversity) mode or duplicated (RRC Diversity) mode, in order to enhance the robustness of MCG SRB.
The configuration of "SCG leg" for MCG Split SRB /Duplication involves a partial radio protocol stack on SN side (RLC/MAC/PHY), which is generated by SN but should not be transparent to MN, i.e. MN should know whether the "SCG leg" for MCG Split SRB /Duplication is configured or not. It is worth noting that from MN perspective, MCG Split SRB is the precondition for MCG SRB Duplication, but from SN perspective, MCG Split SRB makes no differences from MCG SRB Duplication, i.e. SN does not care whether the RRC-PDCP PDU is duplicated one or not.

Observation 1: SCG SRB is an independent item from the SCG leg for MCG Split SRB /Duplication.
Observation 2: MCG Split SRB is the precondition for MCG SRB Duplicated operation.
Observation 3: SN does not distinguish between MCG Split SRB and Duplication operation.

AT&T, et al. Ex. 1002 p. 320 of 393 DAINGEAN_0004478

Based on above characteristics, we do not see any technical reason for MN to request establishment of SCG SRB, as it is only usable for SN, but useless for MN at all, i.e. it is non sensible to convey MCG RRC PDUs over SCG SRB. However, MN needs to request establishment of "SCG leg" for MCG Split SRB /Duplication, but does not need to tell SN whether it is for MCG Split SRB or Duplication operation.

Proposal 1: MN cannot request establishment of SCG SRB, and the existence of SCG SRB is transparent to MN.
Proposal 2: When MN requests establishment of "SCG leg" for MCG Split SRB /Duplication, MN does not tell SN whether it is for MCG Split SRB or Duplication operation.

RAN2 agreed that "SCG SRB and the SCG leg of split SRB1/2 will be independently configured" but RAN2 does not explicitly conclude whether the SCG legs for SRB1/2 should be coupled or separated configured. From SN viewpoints, the SCG legs for SRB1/2 should be distinguished and also independently configured.

Therefore two new IE e.g. *"Requesting MCG SRB1 Split Operation"* and *"Requesting MCG SRB2 Split Operation"* should be included in SgNB Addition/Modification Request Messages. There is no need to mention "Duplication" in the IE name any more.

Regardless of SCG SRB or "SCG leg" for MCG Split SRB /Duplication, it consumes SN resource, hence SN should be able to reject its establishment request. Therefore two new IE e.g. *"Rejecting MCG SRB1 Split Operation"* and *"Rejecting MCG SRB2 Split Operation"* should be included in SgNB Addition/Modification Request Acknowledge Messages, otherwise the configuration for "SCG leg" is provided by SN.

Proposal 3: To introduce two new IEs e.g. "Requesting MCG SRB1 Split Operation" and "Requesting MCG SRB2 Split Operation" in SgNB Addition/Modification Request Messages, and two new IEs e.g. "Rejecting MCG SRB1 Split Operation" and "Rejecting MCG SRB2 Split Operation" in SgNB Addition/Modification Request Acknowledge Messages.

If we take the [2] from RAN3#95bis as the working document, then above new IEs should be added in the first IE level as illustrated in Annex (Not exhaustively!).

For MCG Split SRB /Duplication operation, the RRC PDCP PDUs need to be transferred between MN and SN over X2/Xn interface. In RAN3#96, it has been taken as WF that F1AP/SCTP signalling transport is used to transfer RRC messages between CU and DU. If similar principle is taken, then X2AP/XnAP should also support transferring RRC PDCP PDUs between MN and SN, otherwise, GTP-U tunnel is used as split bearer case.

Proposal 4: X2AP/XnAP should also support transferring RRC PDCP PDUs between MN and SN.

3. Conclusion

RAN3 is kindly asked to consider following proposals:

Proposal 1: MN cannot request establishment of SCG SRB, and the existence of SCG SRB is transparent to MN.

Proposal 2: When MN requests establishment of "SCG leg" for MCG Split SRB /Duplication, MN does not tell SN whether it is for MCG Split SRB or Duplication operation.

Proposal 3: To introduce two new IEs e.g. "Requesting MCG SRB1 Split Operation" and "Requesting MCG SRB2 Split Operation" in SgNB Addition/Modification Request Messages, and two new IEs e.g. "Rejecting MCG SRB1 Split Operation" and "Rejecting MCG SRB2 Split Operation" in SgNB Addition/Modification Request Acknowledge Messages.

Proposal 4: X2AP/XnAP should also support transferring RRC PDCP PDUs between MN and SN.

4. References

[1] TR 38.801 v200, NTT DOCOMO

[2] R3-171376

5. Annex

9.1.X.1 SGNB ADDITION REQUEST

This message is sent by the MeNB to the SgNB to request the preparation of resources for dual connectivity operation for a specific UE

Direction: MeNB → SgNB.

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DAINGEAN_0004480

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		reject	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	reject	reject
UE Security Capabilities	C-ifSCGorSCGsplitBearerOption		9.2.29		reject	reject
SgNB Security Key	C-ifSCGorSCGsplitBearerOption		9.2.XX	The S-KgNB which is provided by the MeNB, see TS 33.401 [18].	reject	reject
SgNB UE Aggregate Maximum Bit Rate	M		UE Aggregate Maximum Bit Rate 9.2.12	The UE Aggregate Maximum Bit Rate is split into MeNB UE Aggregate Maximum Bit Rate and SgNB UE Aggregate Maximum Bit Rate which are enforced by MeNB and SgNB respectively.	reject	reject
Serving PLMN	O		PLMN Identity 9.2.4	The serving PLMN of the SCG in the SgNB.	reject	ignore
Requesting MCG SRB1 Split Operation	O		ENUMERATED (True, ...)	Requesting establishment resources for MCG SRB1 Split Operation	reject	ignore
Requesting MCG SRB2 Split Operation	O		ENUMERATED (True, ...)	Requesting establishment resources for MCG SRB2 Split Operation	reject	ignore
E-RABs To Be Added List		1			reject	reject
>E-RABs To Be Added Item		1.. <maxnoof Bearers>			reject	reject
>>CHOICE Bearer Option	M				reject	
>>>*SCG Bearer*					reject	
>>>>E-RAB ID	M		9.2.23		reject	
>>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters.	reject	
>>>>DL Forwarding	O		9.2.5		reject	
>>>>S1 UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	reject	
>>>>Correlation ID	O		Correlation ID 9.2.84		ignore	ignore
>>>>SIPTO Correlation ID	O		Correlation ID 9.2.84		ignore	ignore
>>>*Split Bearer*					reject	
>>>>E-RAB ID	M		9.2.23		reject	
>>>>E-RAB Level QoS Parameters	M		9.2.9	Includes necessary QoS parameters.	reject	
>>>>MeNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2 transport bearer. For delivery	reject	

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				of UL PDUs.		
>>>SCG split Bearer					*	*
>>>>E-RAB ID	M		9.2.23		*	*
>>>> E-RAB Level QoS Parameters	M		E-RAB Level QoS Parameters 9.2.9	Includes the E-RAB Level QoS parameters as received on S1-MME for the E-RAB	*	*
>>>>DL Forwarding	O		9.2.5		*	*
>>>>MeNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	MeNB endpoint of the X2 transport bearer. For delivery of DL PDUs.	*	*
>>>>S1 UL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SGW endpoint of the S1 transport bearer. For delivery of UL PDUs.	*	*
>>>>SIPTO Correlation ID	O		Correlation ID 9.2.84		*	*
UE NR Access Capability	M			UE Radio Access Capability in NR defined in TS 38.331	YES	reject
UE Capability Coordination Item		*1*		Editor's Note: UE capability coordination is pending on RAN2	YES	reject
SCG To Be Added		*1*			YES	reject
>Secondary Cell Item		*1 <maxnoofSCG>*			:	:
>>ECGI			ECGI 9.2.14	E-UTRAN Cell Global Identifier of the neighbour cell	:	:
CSG Membership Status	O		9.2.52		YES	reject
SgNB UE X2AP ID	O		eNB UE X2AP ID 9.2.24	Allocated at the SgNB	YES	reject
SgNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SgNB	YES	reject
Expected UE Behaviour	O		9.2.70		YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject

9.1.X.2 SGNB ADDITION REQUEST ACKNOWLEDGE

This message is sent by the SgNB to confirm the MeNB about the SgNB addition preparation.

Direction: SgNB → MeNB.

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DAINGEAN_0004482

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.13		reject	reject
MeNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the MeNB	reject	reject
SgNB UE X2AP ID	M		eNB UE X2AP ID 9.2.24	Allocated at the SgNB	reject	reject
Rejecting MCG SRB1 Split Operation	O		ENUMERATED (True, ...)	Rejecting establishment resources for MCG SRB1 Split Operation	reject	ignore
Rejecting MCG SRB2 Split Operation	O		ENUMERATED (True, ...)	Rejecting establishment resources for MCG SRB2 Split Operation	reject	ignore
E-RABs Admitted To Be Added List		1			reject	ignore
>E-RABs Admitted To Be Added Item		1 .. <maxnoof Bearers>			reject	ignore
>>CHOICE Bearer Option	M				reject	
>>>*SCG Bearer*					reject	
>>>>E-RAB ID	M		9.2.23		reject	
>>>>S1 DL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	reject	
>>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs.	reject	
>>>>UL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs.	reject	
>>>*Split Bearer*					reject	
>>>>E-RAB ID	M		9.2.23		reject	
>>>>SgNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	Endpoint of the X2 transport bearer at the SgNB.	reject	
>>>*SCG split Bearer*					reject	
>>>>E-RAB ID	M		9.2.23		reject	
>>>>S1 DL GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the S1 transport bearer. For delivery of DL PDUs.	reject	
>>>>SgNB GTP Tunnel Endpoint	M		GTP Tunnel Endpoint 9.2.1	SgNB endpoint of the X2 transport bearer. For delivery of UL PDUs.	reject	
>>>>DL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of DL PDUs.	reject	
>>>>UL Forwarding GTP Tunnel Endpoint	O		GTP Tunnel Endpoint 9.2.1	Identifies the X2 transport bearer used for forwarding of UL PDUs.	reject	
E-RABs Not Admitted List	O		E-RAB List 9.2.28	A value for *E-RAB ID* shall only be present once in *E-*	reject	ignore

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				RABs Admitted List IE and in *E-RABs Not Admitted List* IE.		
SgNB to MeNB Container	M		OCTET STRING	Includes the *RRCConnectionReconfiguration* message as defined in TS 38.331.	YES	reject
Criticality Diagnostics	O		9.2.7		YES	ignore
GW Transport Layer Address	O		BIT STRING (1..160, ...)	Indicating GW Transport Layer Address.	YES	ignore
SIPTO L-GW Transport Layer Address	O		BIT STRING (1..160, ...)	Indicating SIPTO L-GW Transport Layer Address.	YES	ignore
MeNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the MeNB	YES	reject
SgNB UE X2AP ID Extension	O		Extended eNB UE X2AP ID 9.2.86	Allocated at the SgNB	YES	reject
Tunnel Information for BBF	O		Tunnel Information 9.2.89	Indicating eNB's Local IP Address assigned by the broadband access provider, UDP port Number.	YES	ignore

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DAINGEAN_0004484

Electronic Patent Application Fee Transmittal

Application Number:	16637693
Filing Date:	07-Feb-2020
Title of Invention:	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
First Named Inventor/Applicant Name:	FANGYING XIAO
Filer:	Aaron James Capron/Sylvia Lopez
Attorney Docket Number:	US80118

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

DAINGEAN_0004485

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	1806	1	260	260
		Total in USD ($)		**260**

Electronic Acknowledgement Receipt

EFS ID:	43019575
Application Number:	16637693
International Application Number:	
Confirmation Number:	2923
Title of Invention:	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
First Named Inventor/Applicant Name:	FANGYING XIAO
Customer Number:	145688
Filer:	Aaron James Capron/Sylvia Lopez
Filer Authorized By:	Aaron James Capron
Attorney Docket Number:	US80118
Receipt Date:	17-JUN-2021
Filing Date:	07-FEB-2020
Time Stamp:	16:09:06
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	$260
RAM confirmation Number	E20216GG09340355
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	17R00887-US80118_POA.pdf	1106448 09a1a24fc240ccc125a97ebdd96fecb615ef5c74	no	3
Warnings:					
Information:					
2	Transmittal Letter	17R00887-US80118_IDS_Transmittal.pdf	23732 e9bd430288b88988b59f0e74c0e092f7a51eb6bb	no	3
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	17R00887-US80118_IDS_SB08.pdf	26444 5c72be5f454211e5f3dd0e4d7d54a2c5be8b0d8d	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Foreign Reference	1-CN105684496A.pdf	4446062 d5840645bda81e0498ba452152ae703d2c71fc4f	no	32
Warnings:					
Information:					
5	Foreign Reference	2-WO2016064334A1.pdf	2266191 edbd7deb02741c4285d7e37a281d654821349cbd	no	32
Warnings:					
Information:					
6	Non Patent Literature	3-ISR_WO.pdf	662167 33ddec2c0913825d4fbff987e51d26b0ea3f5305	no	6
Warnings:					

Information:					
7	Non Patent Literature	4-EP_Communication.pdf	765419 759932dd81d9bb4a48da1ed4bc2b5c1056318150	no	8
Warnings:					
Information:					
8	Non Patent Literature	5-R3-172053.pdf	300056 1f387dfb2b8cbe81b0b9dc037b18e423dfb535e3	no	7
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	30857 2dbb6a2d5a1efe66a4d4f764e9ad04cbeb4f1272	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	9627376		

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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/637,693	02/07/2020	FANGYING XIAO	15521.0018-00000

CONFIRMATION NO. 2923

POA ACCEPTANCE LETTER

22852
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

OC000000126466274

Date Mailed: 06/23/2021

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/17/2021.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/rnegga/

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UNITED STATES DEPARTMENT OF COMMERCE
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/637,693	02/07/2020	FANGYING XIAO	US80118

CONFIRMATION NO. 2923

POWER OF ATTORNEY NOTICE

145688
SBPJ/ScienBiziP, P.C.
550 South Hope Street
Suite 2825
Los Angeles, CA 90071

OC000000126466233

Date Mailed: 06/23/2021

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 06/17/2021.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/rnegga/

To: regional-desk@finnegan.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 22852

Jun 23, 2021 04:20:15 AM

Dear PAIR Customer:

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413
UNITED STATES

The following USPTO patent application(s) associated with your Customer Number, 22852 , have new outgoing correspondence. This correspondence is now available for viewing in Private PAIR.

The official date of notification of the outgoing correspondence will be indicated on the form PTOL-90 accompanying the correspondence.

Disclaimer:
The list of documents shown below is provided as a courtesy and is not part of the official file wrapper. The content of the images shown in PAIR is the official record.

Application	Document	Mailroom Date	Attorney Docket No.
16637693	N570	06/23/2021	15521.0018-00000
	N570	06/23/2021	15521.0018-00000

To view your correspondence online or update your email addresses, please visit us anytime at https://sportal.uspto.gov/secure/myportal/privatepair.

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Monday - Friday 6:00 a.m. to 12:00 a.m.

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PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

Electronic Acknowledgement Receipt

EFS ID:	43112745
Application Number:	16637693
International Application Number:	
Confirmation Number:	2923
Title of Invention:	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
First Named Inventor/Applicant Name:	FANGYING XIAO
Customer Number:	22852
Filer:	Aaron James Capron/Sylvia Lopez
Filer Authorized By:	Aaron James Capron
Attorney Docket Number:	15521.0018-00000
Receipt Date:	28-JUN-2021
Filing Date:	07-FEB-2020
Time Stamp:	21:01:00
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	17R00887-US80118_Amendment_15521-0018.pdf	36496 9c75276274e74885ad57150ec5b76b68aef025fa	no	7

Warnings:

DAINGEAN_0004493

Information:	
Total Files Size (in bytes):	36496

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

United States Patent and Trademark Office

Office of the Chief Financial Officer

Document Code:WFEE

User :68604

Sale Accounting Date:06/29/2021

Sale Item Reference Number	Effective Date
16637693	06/28/2021

Document Number	Fee Code	Fee Code Description	Amount Paid	Payment Method
I20216SE05293148	1614	INDEPENDENT CLAIMS IN EXCESS OF 3	$480.00	Deposit Account

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 16/637,693	Filing Date 02/07/2020	☐ To be Mailed

ENTITY: ☑ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED - PART I

	(Column 1)	(Column 2)			
FOR	NUMBER FILED	NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		x $100 =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		x $460 =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).				
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT	06/28/2021	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 8	Minus	** 20	= 0		x $100 =	0
	Independent (37 CFR 1.16(h))	* 4	Minus	*** 3	= 1		x $480 =	480
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	480

		(Column 1)		(Column 2)	(Column 3)			
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=		x $0 =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=		x $0 =	
	☐ Application Size Fee (37 CFR 1.16(s))							
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							
							TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.	LIE
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".	/JASON B EADDY/
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".	
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.	

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PATENT
Customer Number: 22,852
Attorney Docket No. 15521.0018-00000

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	
Fangying XIAO et al.	)	Group Art Unit: 2646
	)	
Application No.: 16/637,693	)	Examiner: Gary LAFONTANT
	)	
Filed: February 7, 2020	)	
	)	Confirmation No.: 2923
For: USER EQUIPMENT, BASE STATION, AND RELATED METHODS	)	
	)	
	)	***VIA EFS-WEB***

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

AMENDMENT

In response to the Office Action dated April 1, 2021, the period for response extending through July 1, 2021, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims beginning on page 2 of this paper.

Remarks follow the amendments section of this paper.

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently Amended) A method ~~used in~~ for User Equipment (UE), wherein the UE ~~being~~ is configured with a first Master Cell Group (MCG) duplicated Signaling Radio Bearer (SRB) and a second MCG duplicated SRB, and the first MCG duplicated SRB ~~being~~ is associated with an MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, [[and]] the method comprising:

detecting an SCG failure; [[and]]

reconfiguring the first MCG duplicated SRB to be used for uplink transmission via the MCG, or triggering an MCG failure; and

reconfiguring the second MCG duplicated SRB to be used for uplink transmission via the MCG.

2. (Canceled)

3. (Currently Amended) The method according to claim 1, further comprising:

reporting the SCG failure to a base station~~, wherein the reporting the SCG failure to a base station comprises~~ by:

transmitting information about the SCG failure ~~information~~ to the base station via the MCG by using the reconfigured first MCG duplicated SRB[[,]]; or

transmitting the information about the SCG failure ~~information~~ to the base station through a Common Control Channel (CCCH) by using [[the]] an MCG SRB.

4. (Currently Amended) The method according to claim 1, further comprising:

receiving, from [[the]] a base station, ~~instruction~~ information instructing the UE whether to perform uplink transmission via the MCG when the SCG ~~fails~~ failure is detected,

wherein ~~the reconfiguration is performed only when the instruction~~ in response to the information ~~instructs~~ instructing the UE to perform uplink transmission via the MCG when the SCG ~~fails~~ failure is detected, the first MCG duplicated SRB is reconfigured to be used for uplink transmission via the MCG.

5. (Currently Amended) User Equipment (UE), wherein the UE is configured with a first Master Cell Group (MCG) duplicated Signaling Radio Bearer (SRB) and a second MCG duplicated SRB, and the first MCG duplicated SRB is associated with an MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, the UE comprising: ~~a transceiver, a processor, and a memory, the processor storing instructions executable by the processor to cause the UE to perform the method according to claim 1~~

a memory storing instructions; and

a processor configured to execute the instructions to cause the UE to:

detect an SCG failure;

reconfigure the first MCG duplicated SRB to be used for uplink transmission via the MCG, or trigger an MCG failure; and

reconfigure the second MCG duplicated SRB to be used for uplink transmission via the MCG.

6. (Currently Amended) A method ~~used in~~ for a base station, wherein the base station ~~being~~ includes a Master Cell Group (MCG) base station and ~~communicating~~ communicates with User Equipment (UE) over [[an]] a first MCG duplicated Signaling Radio Bearer (SRB) and a second MCG duplicated SRB, and the first MCG duplicated SRB ~~being~~ is associated with the MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, [[and]] the method comprising:

receiving, from the UE, a report [[on]] of an SCG failure; [[and]]

reconfiguring the first MCG duplicated SRB to receive uplink transmission via the MCG; and

reconfiguring the second MCG duplicated SRB to receive uplink transmission via the MCG.

7. (Currently Amended) The method according to claim 6, wherein [[the]] receiving [[a]] the report ~~on an~~ of the SCG failure comprises:

receiving information about the SCG failure ~~information~~ via the MCG by using the reconfigured first MCG duplicated SRB[[,]]; or

receiving the information about the SCG failure ~~information~~ through a Common Control Channel (CCCH) by using [[the]] an MCG SRB.

8. (Canceled)

9. (Currently Amended) The method according to claim 6, further comprising:

transmitting, to the UE, ~~instruction~~ information instructing the UE whether to perform uplink transmission via the MCG when the SCG ~~fails~~ failure is detected.

10. (Currently Amended) A base station, wherein the base station includes a Master Cell Group (MCG) base station and communicates with User Equipment (UE) over a first MCG duplicated Signaling Radio Bearer (SRB) and a second MCG duplicated SRB, and the first MCG duplicated SRB is associated with the MCG and a Secondary Cell Group (SCG) and configured to be used for uplink transmission via the SCG, the base station comprising: ~~a transceiver, a processor, and a memory, the processor storing instructions executable by the processor to cause the base station to perform the method according to claim 6~~

a memory storing instructions; and

a processor configured to execute the instructions to cause the base station to:

receive, from the UE, a report of an SCG failure;

reconfigure the first MCG duplicated SRB to receive uplink transmission via the MCG; and

reconfigure the second MCG duplicated SRB to receive uplink transmission via the MCG.

REMARKS

I. Status of Claims

In the Office Action[1] dated April 1, 2021 ("Office Action"), the Office took the following actions:

a) rejected claims 1, 3, 5-7, 9, and 10 under 35 U.S.C. § 102(a)(2) as allegedly anticipated by U.S. Publication No. 2019/0342148 A1 to Hong ("*Hong*"); and

b) objected to claims 2, 4, and 8 as dependent upon a rejected base claim, but allowable if rewritten in independent form.

Applicant rewrites independent claims 1, 5, 6, and 10 to incorporate allowable subject matter of claims 2 and 8, and amends claims 3, 4, 7, and 9. Additional amendments are made to improve form, while maintaining the same claim scope. No prohibited new matter has been added. Applicant also cancels claims 2 and 8 without prejudice to, or disclaimer of, any subject matter.

II. Conclusion

Since independent claims 1, 5, 6, and 10 each contain subject matter indicated by the Examiner as allowable, Applicant respectfully submits that these claims are allowable over the art of record. Moreover, claims 3, 4, 7, and 9, which depend on claim 1 or 6, are also allowable over the art of record. Since all pending claims recite subject matter indicated by the Examiner as allowable over the art of record, Applicant respectfully requests the Examiner to allow these claims and pass this application to issue.

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[1] The Office Action may contain statements reflecting characterizations of the related art and the claims. Regardless of whether any such statement is identified herein, Applicant declines to automatically subscribe to any statement or characterization in the Office Action.

Please grant any extensions of time required to enter this response and charge any additional required fees to Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: June 28, 2021

By: /Aaron J. Capron/ Reg. No. 56,170 for
Houtan Khalili Esfahani
Reg. No. 41,893
(202) 408-4000

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

22852 7590 07/23/2021

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

EXAMINER	
LAFONTANT, GARY	
ART UNIT	**PAPER NUMBER**
2646	

DATE MAILED: 07/23/2021

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/637,693	02/07/2020	FANGYING XIAO	15521.0018-00000	2923

TITLE OF INVENTION: USER EQUIPMENT, BASE STATION, AND RELATED METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	10/25/2021

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

22852 7590 07/23/2021

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/637,693	02/07/2020	FANGYING XIAO	15521.0018-00000	2923

TITLE OF INVENTION: USER EQUIPMENT, BASE STATION, AND RELATED METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	10/25/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
LAFONTANT, GARY	2646	370-329000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. Fees submitted: ❑ Issue Fee ❑ Publication Fee (if required) ❑ Advance Order - # of Copies _____

4b. Method of Payment: *(Please first reapply any previously paid fee shown above)*

❑ Electronic Payment via EFS-Web ❑ Enclosed check ❑ Non-electronic payment by credit card (Attach form PTO-2038)

❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29

❑ Applicant asserting small entity status. See 37 CFR 1.27

❑ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/637,693	02/07/2020	FANGYING XIAO	15521.0018-00000	2923

22852 7590 07/23/2021

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

EXAMINER	
LAFONTANT, GARY	

ART UNIT	PAPER NUMBER
2646	

DATE MAILED: 07/23/2021

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

DAINGEAN_0004507

Notice of Allowability	Application No. 16/637,693	Applicant(s) XIAO et al.	
	Examiner GARY LAFONTANT	Art Unit 2646	AIA (FITF) Status Yes

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☑ This communication is responsive to claims submission 06/28/2021.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

3. ☑ The allowed claim(s) is/are 1,3-7 and 9-10 . As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information , please see **http://www.uspto.gov/patents/init_events/pph/index.jsp** or send an inquiry to **PPHfeedback@uspto.gov.**

4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:

   1. ☐ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____ .

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☑ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____.
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material _____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date. _____.
5. ☐ Examiner's Amendment/Comment
6. ☑ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/GARY LAFONTANT/
Examiner, Art Unit 2646

Notice of Pre-AIA or AIA Status

The present application, filed on or after March 16, 2013, is being examined under the first inventor to file provisions of the AIA.

DETAILED ACTION

Receipt is acknowledged of amendments/arguments filed on **06/28/2021.**

Claims 1, 3-7, 9 and 10 are presented for examination.

Allowable Subject Matter

Claims 1, 5, 6 and 10 are allowed.

The following is an examiner's statement of reasons for allowance:

Independent **claims 1, 5, 6 and 10** are allowable in view of primary reference **Hong (US 2019/0342148 A1),** considered to be closed to the applicant subject matter, does not teach the amended independent claims.

Therefore, **Claims 1, 3-7, 9 and 10** are considered novel and non-obvious and are therefore allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GARY LAFONTANT whose telephone number is (571)272-3037. The examiner can normally be reached on 9:00AM -5:00PM. Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lester Kincaid can be reached on 571-272-7922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/GARY LAFONTANT/

Examiner, Art Unit 2646

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/637,693	XIAO et al.
	Examiner	**Art Unit**
	GARY LAFONTANT	2646

CPC						
Symbol					**Type**	**Version**
H04W	/	24	/	02	F	2013-01-01
H04W	/	76	/	18	I	2018-02-01
H04W	/	76	/	27	I	2018-02-01
H04W	/	84	/	20	A	2013-01-01

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
	/		/					

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	8	
/GARY LAFONTANT/ Examiner, Art Unit 2646	17 July 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20210717

AT&T, et al. Ex. 1002 p. 354 of 393

DAINGEAN_0004512

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/637,693	XIAO et al.
	Examiner	**Art Unit**
	GARY LAFONTANT	2646

INTERNATIONAL CLASSIFICATION				
CLAIMED				
H04L	/	12	/	24
H04W	/	76	/	27
H04W	/	76	/	15
H04W	/	28	/	02

NON-CLAIMED				
	/		/	

US ORIGINAL CLASSIFICATION	
CLASS	**SUBCLASS**

CROSS REFERENCES(S)						
CLASS	**SUBCLASS (ONE SUBCLASS PER BLOCK)**					

NONE (Assistant Examiner) (Date)	**Total Claims Allowed:** 8	
/GARY LAFONTANT/ Examiner, Art Unit 2646 (Primary Examiner) (Date) 17 July 2021	O.G. Print Claim(s) 1	O.G. Print Figure 1

U.S. Patent and Trademark Office Part of Paper No.: 20210717

AT&T, et al. Ex. 1002 p. 355 of 393 DAINGEAN_0004513

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/637,693	XIAO et al.
	Examiner	**Art Unit**
	GARY LAFONTANT	2646

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIMS

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	8	10												
	2														
2	3														
3	4														
4	5														
5	6														
6	7														
	8														
7	9														

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	8	
/GARY LAFONTANT/ Examiner, Art Unit 2646	17 July 2021	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office — Part of Paper No.: 20210717

AT&T, et al. Ex. 1002 p. 356 of 393

DAINGEAN_0004514

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/637,693	XIAO et al.
	Examiner	Art Unit
	GARY LAFONTANT	2646

CPC - Searched*		
Symbol	Date	Examiner
All	03/27/2021	GL
All	07/17/2021	GL

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

Search Notes		
Search Notes	Date	Examiner
East	03/27/2021	GL
PE2E Search	07/17/2021	GL

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
Same as Above	Same as Above	07/17/2021	GL

/GARY LAFONTANT/ Examiner, Art Unit 2646	

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	16/637,693	XIAO et al.
	Examiner	Art Unit
	GARY LAFONTANT	2646

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	03/27/2021	07/17/2021							
1	1	✓	=							
	2	O	-							
2	3	✓	=							
3	4	O	=							
4	5	✓	=							
5	6	✓	=							
6	7	✓	=							
	8	O	-							
7	9	✓	=							
8	10	✓	=							

PE2E SEARCH - Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
L1	26335	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:09 PM
L2	1884	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:29 PM
L3	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:31 PM
L5	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:33 PM
L6	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:34 PM
L7	440	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:34 PM

L8	343	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:35 PM
L9	108	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:36 PM
L10	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink SAME Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:37 PM
L11	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:49 PM
L12	7	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/02/17 01:50 PM
L13	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/18 08:12 PM

		(duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"					
L14	17	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) NEAR2 (Fail$3 OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/19 12:27 AM
L15	3	duplicated ADJ2 ((Signaling ADJ2 Radio ADJ2 Bearer) OR (SRB)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/19 07:01 PM
L16	11	dual ADJ2 ((Signaling ADJ2 Radio ADJ2 Bearer) OR (SRB)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/19 07:04 PM
L17	69	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink AND @ad<20170810	(US-PGPUB; USPAT)	OR	ON	ON	2021/03/21 10:59 PM
L18	245	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink AND @ad<20170810	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/21 11:00 PM
L19	0	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink NEAR9 (SRB OR (Signal ADJ2 Radio ADJ2 Bearer)) AND @ad<20170810	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/21 11:02 PM
L20	7	(configuration OR	(US-PGPUB; USPAT;	OR	ON	ON	2021/03/21

		reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink SAME (SRB OR (Signal ADJ2 Radio ADJ2 Bearer)) AND @ad<20170810	USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)				11:02 PM
L21	55	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink AND fail$3 AND @ad<20170810	(US-PGPUB; USPAT)	OR	ON	ON	2021/03/23 12:54 AM
L22	45	((US-20190208474-A1 OR US-20180145851-A1 OR US-20170230843-A1 OR US-20190159274-A1 OR US-20170215125-A1 OR US-20200177316-A1 OR US-20200127886-A1 OR US-20160182204-A1 OR US-20170230913-A1 OR US-20180279173-A1 OR US-20180234927-A1 OR US-20180084540-A1 OR US-20180048498-A1 OR US-20170366313-A1 OR US-20170230917-A1 OR US-20170215155-A1 OR US-20170202025-A1 OR US-20170195028-A1 OR US-20170164299-A1 OR US-20170164296-A1 OR US-20170142666-A1 OR US-20170111832-A1 OR US-20170111932-A1 OR US-20170105179-A1 OR US-20170013565-A1 OR US-20160338039-A1 OR US-20160286412-A1 OR US-20160242182-A1 OR US-20160100447-	(USPAT; US-PGPUB; FPRS; USOCR; IBM_TDB; EPO; JPO; DERWENT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO))	OR	ON	ON	2021/03/26 09:52 PM

		A1 OR US-20160014706-A1 OR US-20150350955-A1 OR US-20150350944-A1 OR US-20150333896-A1 OR US-20150334769-A1 OR US-20150327107-A1 OR US-20150271726-A1 OR US-20150271761-A1 OR US-20150215930-A1 OR US-20150124743-A1 OR US-20190342148-A1).did. AND PGPB.dbnm.) OR ((EP-3297362-A1 OR JP-2017513306-A).did. AND FTDB.dbnm.) OR ((US-9999006-B2 OR US-9876620-B2 OR US-9961606-B2).did. AND USPT.dbnm.)					
L23	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 01:18 AM
L24	590	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND (Handoff OR Handover OR (Hand$3 NEAR Off) OR (Hand$3 NEAR Over) OR HandIn OR (Hand$3 NEAR IN) OR (Off$1load$3)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 01:32 AM
L25	3	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (dual OR duplicat$3) NEAR2 ((SRB OR (Signal$3 ADJ2 Radio	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 01:32 AM

		ADJ2 Bearer))) AND (Handoff OR Handover OR (Hand$3 NEAR Off) OR (Hand$3 NEAR Over) OR HandIn OR (Hand$3 NEAR IN) OR (Off$1load$3)) AND @ad<"20170810"					
L26	26335	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:09 PM
L27	1884	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:29 PM
L28	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:31 PM
L29	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:33 PM
L30	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:34 PM
L31	440	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:34 PM

		ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"					
L32	343	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:35 PM
L33	108	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:36 PM
L34	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink SAME Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:37 PM
L35	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:49 PM
L36	7	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:50 PM

L37	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/18 08:12 PM
L38	17	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) NEAR2 (Fail$3 OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/19 12:27 AM
L39	11	dual ADJ2 (((Signaling ADJ2 Radio ADJ2 Bearer) OR (SRB))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/19 07:12 PM
L40	9	dual ADJ2 (((Signaling ADJ2 Radio ADJ2 Bearer) OR (SRB))) AND fail$4 AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/19 09:08 PM
L41	26335	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:09 PM
L42	1884	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:29 PM
L43	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:31 PM
L44	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	OFF	2021/02/17 01:33 PM

		OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND @ad<"20170810"	IBM_TDB)				
L45	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:34 PM
L46	440	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:34 PM
L47	343	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:35 PM
L48	108	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:36 PM
L49	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:37 PM

		uplink SAME Failure AND @ad<"20170810"					
L50	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:49 PM
L51	7	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:50 PM
L52	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/18 08:12 PM
L53	17	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) NEAR2 (Fail$3 OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/19 12:27 AM
L54	26335	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:09 PM
L55	1884	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:29 PM

		@ad<"20170810"					
L56	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:31 PM
L57	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:33 PM
L58	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:34 PM
L59	440	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:34 PM
L60	343	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:35 PM
L61	108	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	OFF	OFF	2021/02/17 01:36 PM

		OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND Failure AND @ad<"20170810"	IBM_TDB)				
L62	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink SAME Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:37 PM
L63	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:49 PM
L64	7	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/02/17 01:50 PM
L65	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/18 08:12 PM
L66	17	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/19 12:27 AM

		(SCG OR (Secondary ADJ2 Cell ADJ2 Group)) NEAR2 (Fail$3 OR fault)) AND @ad<"20170810"					
L70	26381	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L71	1879	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L72	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L73	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L74	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L75	442	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM

		@ad<"20170810"					
L76	346	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L77	82	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L78	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink SAME Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L79	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L80	9	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L81	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT;	OR	ON	ON	2021/03/27 03:39 PM

		OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	IBM_TDB)				
L82	18	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) NEAR2 (Fail$3 OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L83	3	duplicated ADJ2 ((Signaling ADJ2 Radio ADJ2 Bearer) OR (SRB)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L84	11	dual ADJ2 ((Signaling ADJ2 Radio ADJ2 Bearer) OR (SRB)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L85	70	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink AND @ad<20170810	(US-PGPUB; USPAT)	OR	ON	ON	2021/03/27 03:39 PM
L86	246	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink AND @ad<20170810	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L87	0	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink NEAR9 (SRB OR (Signal ADJ2 Radio ADJ2 Bearer)) AND	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM

		@ad<20170810					
L88	7	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink SAME (SRB OR (Signal ADJ2 Radio ADJ2 Bearer)) AND @ad<20170810	(US-PGPUB; USPAT; USOCR; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO); FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L89	56	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink AND fail$3 AND @ad<20170810	(US-PGPUB; USPAT)	OR	ON	ON	2021/03/27 03:39 PM
L90	45	((US-20190208474-A1 OR US-20180145851-A1 OR US-20170230843-A1 OR US-20190159274-A1 OR US-20170215125-A1 OR US-20200177316-A1 OR US-20200127886-A1 OR US-20160182204-A1 OR US-20170230913-A1 OR US-20180279173-A1 OR US-20180234927-A1 OR US-20180084540-A1 OR US-20180048498-A1 OR US-20170366313-A1 OR US-20170230917-A1 OR US-20170215155-A1 OR US-20170202025-A1 OR US-20170195028-A1 OR US-20170164299-A1 OR US-20170164296-A1 OR US-20170142666-A1 OR US-20170111832-A1 OR US-20170111932-A1 OR US-20170105179-A1 OR US-20170013565-A1 OR US-20160338039-A1 OR US-20160286412-A1 OR	(USPAT; US-PGPUB; FPRS; USOCR; IBM_TDB; EPO; JPO; DERWENT; FIT (AU, AP, AT, CA, CH, CN, DD, DE, EA, EP, ES, FR, GB, JP, KR, OA, RU, SU, WO))	OR	ON	ON	2021/03/27 03:39 PM

		US-20160242182-A1 OR US-20160100447-A1 OR US-20160014706-A1 OR US-20150350955-A1 OR US-20150350944-A1 OR US-20150333896-A1 OR US-20150334769-A1 OR US-20150327107-A1 OR US-20150271726-A1 OR US-20150271761-A1 OR US-20150215930-A1 OR US-20150124743-A1 OR US-20190342148-A1).did. AND PGPB.dbnm.) OR ((EP-3297362-A1 OR JP-2017513306-A).did. AND FTDB.dbnm.) OR ((US-9999006-B2 OR US-9876620-B2 OR US-9961606-B2).did. AND USPT.dbnm.)					
L91	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L92	590	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND (Handoff OR Handover OR (Hand$3 NEAR Off) OR (Hand$3 NEAR Over) OR HandIn OR (Hand$3 NEAR IN) OR (Off$1load$3)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM
L93	3	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (dual OR duplicat$3)	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	ON	ON	2021/03/27 03:39 PM

		NEAR2 ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND (Handoff OR Handover OR (Hand$3 NEAR Off) OR (Hand$3 NEAR Over) OR HandIn OR (Hand$3 NEAR IN) OR (Off$1load$3)) AND @ad<"20170810"					
L94	26057	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L95	1871	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L96	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L97	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L98	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L99	382	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM

		Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"					
L100	136	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L101	80	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L102	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink SAME Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L103	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L104	9	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM

		@ad<"20170810"					
L105	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L106	18	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) NEAR2 (Fail$3 OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L107	5	dual ADJ2 (((Signaling ADJ2 Radio ADJ2 Bearer) OR (SRB))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L108	3	dual ADJ2 (((Signaling ADJ2 Radio ADJ2 Bearer) OR (SRB))) AND fail$4 AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L109	26057	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L110	1871	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L111	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L112	1	(MCG OR (Master ADJ2 Cell ADJ2	(US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	OFF	2021/03/27 03:39 PM

		Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND @ad<"20170810"	JPO; DERWENT; IBM_TDB)				
L113	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L114	382	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L115	136	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L116	80	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L117	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM

		ADJ2 Bearer))) SAME uplink SAME Failure AND @ad<"20170810"					
L118	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L119	9	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L120	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L121	18	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) NEAR2 (Fail$3 OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L122	26057	(MCG OR (Master ADJ2 Cell ADJ2 Group)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L123	1871	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM

		Cell ADJ2 Group)) AND @ad<"20170810"					
L124	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L125	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L126	1	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L127	382	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L128	136	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND uplink AND Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L129	80	(MCG OR (Master ADJ2 Cell ADJ2	(US-PGPUB; USPAT; USOCR; FPRS; EPO;	OR	OFF	OFF	2021/03/27 03:39 PM

		Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink AND Failure AND @ad<"20170810"	JPO; DERWENT; IBM_TDB)				
L130	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) SAME uplink SAME Failure AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L131	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L132	9	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L133	2	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) AND (duplicat$3 NEAR2 (SRB OR (Signal$3 ADJ2 Radio ADJ2 Bearer))) AND @ad<"20170810"	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM
L134	18	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME ((detect$3 OR determin$3 OR	(US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB)	OR	OFF	OFF	2021/03/27 03:39 PM

		calcula$3) NEAR2 (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) NEAR2 (Fail$3 OR fault)) AND @ad<"20170810"					

PE2E SEARCH - Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	British Equivalents	Time Stamp
N1	0	(MCG OR (Master ADJ2 Cell ADJ2 Group)) SAME (SCG OR (Secondary ADJ2 Cell ADJ2 Group)) SAME uplink SAME ((detect$3 OR determin$3 OR calcula$3) NEAR2 (Failure OR fault)) AND @ad<"20170810"	(US-PGPUB; USPAT)	OR	OFF	OFF	2021/07/17 06:19 PM
N2	0	(configuration OR reconfiguration OR configur$3 OR reconfigur$3) NEAR9 (MCG OR (Master ADJ2 Cell ADJ2 Group)) NEAR9 uplink NEAR9 (SRB OR (Signal ADJ2 Radio ADJ2 Bearer)) AND @ad<"20170810"	(US-PGPUB; USPAT)	OR	ON	ON	2021/07/17 06:20 PM

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Complete if Known	
				Application Number	16/637,693
				Filing Date	February 7, 2020
				First Named Inventor	Fangying XIAO
				Art Unit	2646
				Examiner Name	Gary Lafontant
Sheet	1	of	1	Attorney Docket Number	15521.0018-00000

U.S. PATENTS

Examiner Initials*	Cite No.[1]	Document Number / Number-Kind Code[2] (if known)	Issue or Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-			

U.S. PUBLISHED PATENT APPLICATIONS

Examiner Initials*	Cite No.[3]	Document Number / Number-Kind Code[4] (if known)	Issue or Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-2016/0192249 A1	06-30-2016	WU	
		US-2016/0212753 A1	07-21-2016	WU	
		US-2016/0302256 A1	10-13-2016	SUSITAIVAL	

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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document — Country Code[5] Number[6] Kind Code[7] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	Translation[8]
	1	CN 105684496 A	06-15-2016	LG ELECTRONICS INC.		Abstract
	2	WO 2016/064334 A1	04-28-2016	TELEFONAKTIEBOLAGET L M ERICSSON		

NONPATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	Translation[6]
	3	International Search Report and Written Opinion issued in related International Application No. PCT/CN2018/099379, mailed October 29, 2018 (6 pgs.).	
	4	The extended European search report pursuant to Rule 62 EPC, the supplementary European search report (Art. 153(7) EPC) and the European search opinion issued in related EP Application No. 18844831.0, mailed April 1, 2021 (8 pgs.).	
	5	ZTE, "Configuration of SCG SRB and Split&Duplicated SRB," 3GPP TSG-RAN WG3#Ad-hoc R3-172053, June 26-29, 2017 (7 pgs.)	

Examiner Signature	/GARY LAFONTANT/	Date Considered	07/17/2021

EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /G.L/

Bibliographic Data

Application No: 16/637,693

Foreign Priority claimed: (•) Yes ( ) No

35 USC 119 (a-d) conditions met: [✓] Yes [ ] No [✓] Met After Allowance

Verified and Acknowledged: /GARY LAFONTANT/ (Examiner's Signature) G.L (Initials)

Title: USER EQUIPMENT, BASE STATION, AND RELATED METHODS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
02/07/2020	370	2646	15521.0018-00000
RULE			

APPLICANTS

SHARP KABUSHIKI KAISHA, Sakai City, JAPAN

FG INNOVATION COMPANY LIMITED, Tuen Mun, HONG KONG

INVENTORS

FANGYING XIAO, Shanghai, CHINA

RENMAO LIU, Shanghai, CHINA

CONTINUING DATA

This application is a 371 of PCT/CN2018/099379 08/08/2018

FOREIGN APPLICATIONS

CHINA CN201710683129.0 08/10/2017

IF REQUIRED, FOREIGN LICENSE GRANTED**

02/14/2020

STATE OR COUNTRY

CHINA

ADDRESS

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER
LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413
UNITED STATES

FILING FEE RECEIVED

$1,580

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Application	Document	Mailroom Date	Attorney Docket No.
16637693	NOA	07/23/2021	15521.0018-00000
	1449	07/23/2021	15521.0018-00000

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Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
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P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

22852 7590 07/23/2021

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER LLP
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WASHINGTON, DC 20001-4413

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I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

(Typed or printed name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/637,693	02/07/2020	FANGYING XIAO	15521.0018-00000	2923

TITLE OF INVENTION: USER EQUIPMENT, BASE STATION, AND RELATED METHODS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1200	$0.00	$0.00	$1200	10/25/2021

EXAMINER	ART UNIT	CLASS-SUBCLASS
LAFONTANT, GARY	2646	370-329000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 FINNEGAN, HENDERSON,
2 FARABOW, GARRETT
3 & DUNNER LLP

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE	(B) RESIDENCE: (CITY and STATE OR COUNTRY)
SHARP KABUSHIKI KAISHA	SAKAI CITY, OSAKA, JAPAN
FG INNOVATION COMPANY LIMITED	TUEN MUN, NEW TERRITORIES, HONG KONG

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

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☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

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NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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Authorized Signature /Aaron J. Capron/ Date 2021-08-23

Typed or printed name Aaron J. Capron Registration No. 56,170

Electronic Patent Application Fee Transmittal

Application Number:	16637693
Filing Date:	07-Feb-2020
Title of Invention:	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
First Named Inventor/Applicant Name:	FANGYING XIAO
Filer:	Aaron James Capron/Sylvia Lopez
Attorney Docket Number:	15521.0018-00000

Filed as Large Entity

Filing Fees for U.S. National Stage under 35 USC 371

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	1501	1	1200	1200

DAINGEAN_0004546

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1200**

Electronic Acknowledgement Receipt

EFS ID:	43577264
Application Number:	16637693
International Application Number:	
Confirmation Number:	2923
Title of Invention:	USER EQUIPMENT, BASE STATION, AND RELATED METHODS
First Named Inventor/Applicant Name:	FANGYING XIAO
Customer Number:	22852
Filer:	Aaron James Capron/Sylvia Lopez
Filer Authorized By:	Aaron James Capron
Attorney Docket Number:	15521.0018-00000
Receipt Date:	23-AUG-2021
Filing Date:	07-FEB-2020
Time Stamp:	16:01:47
Application Type:	U.S. National Stage under 35 USC 371

Payment information:

Submitted with Payment	yes
Payment Type	DA
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1	Issue Fee Payment (PTO-85B)	17R00887-US80118_Issue_Fee_Payment_1552-0018.pdf	275058 08beac9f147ae49cbc0cac065114e50bce2941ad	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	38378 b328108f8448aaa0342d5cfe4f6112ea6c3f8b10	no	2
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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/637,693	09/28/2021	11134400	15521.0018-00000	2923

22852 7590 09/08/2021

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LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DC 20001-4413

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

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APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

SHARP KABUSHIKI KAISHA, Sakai City, JAPAN;
FG INNOVATION COMPANY LIMITED, Tuen Mun, HONG KONG;

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Application	Document	Mailroom Date	Attorney Docket No.
16637693	ISSUE.NTF	09/08/2021	15521.0018-00000

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