NR 接入层流程介绍

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修改历史 Revision History

版本号 Version	日期 Date	注释 Notes
V1.0	2019/12/30	初稿

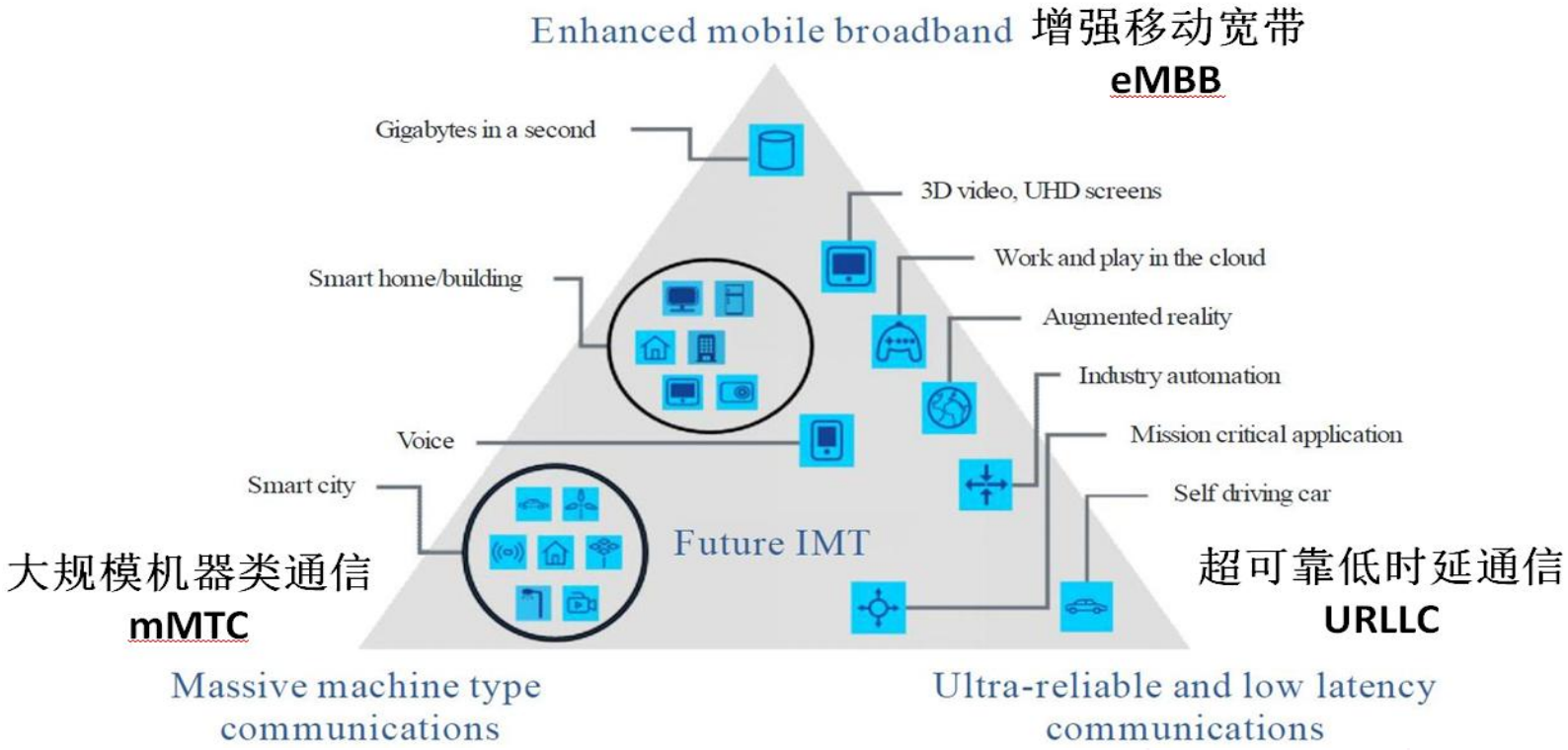
文档信息 Document Information

适用产品信息 Chip Platform	适用版本信息 OS Version	关键字 Keyword
5G 产品	N/A	NR接入层流程介绍

Contents

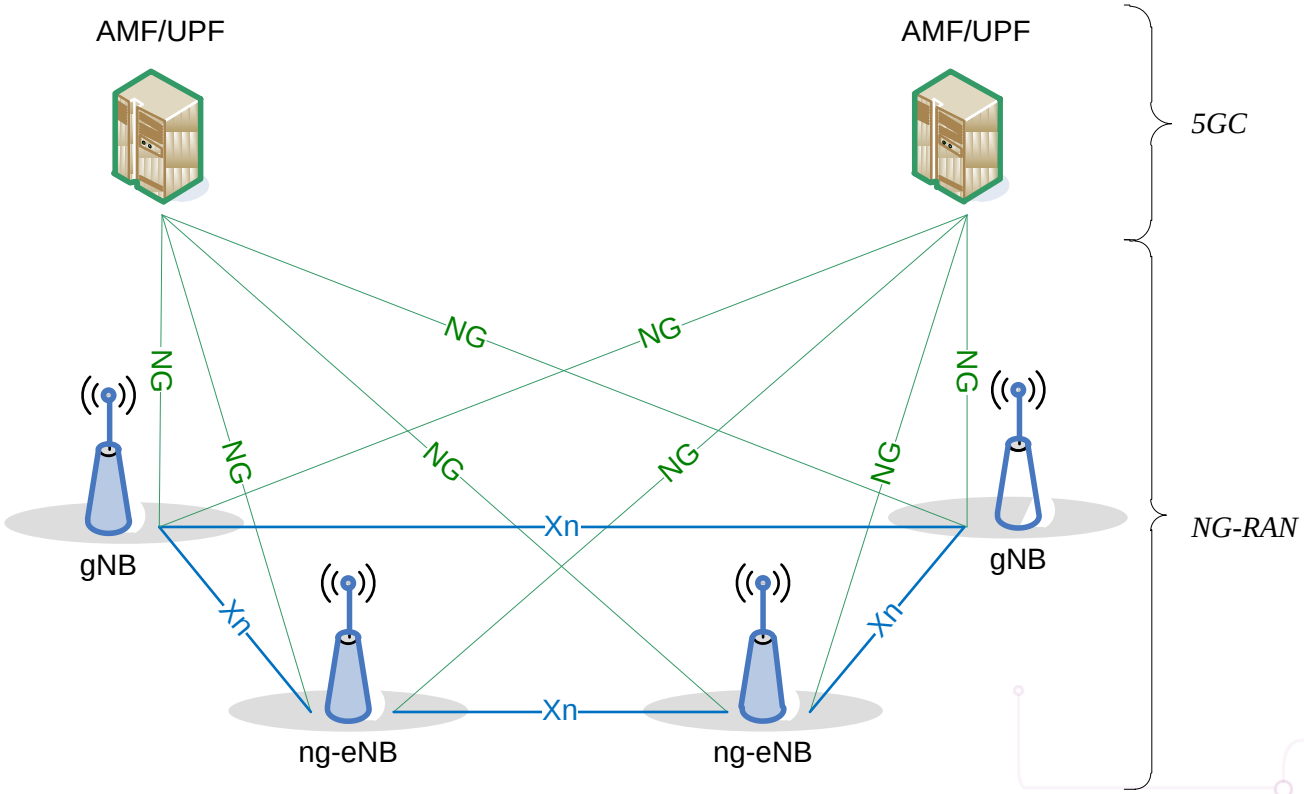
NR愿景与需求

- 总体愿景：信息随心至，万物触手及
- 需求： 5G需求：广覆盖、高容量、多连接、低时延和高可靠性
- 应用场景：增强移动带宽（eMBB）、海量机器类通信（mMTC）、超高可靠性低时延通信（URLLC）



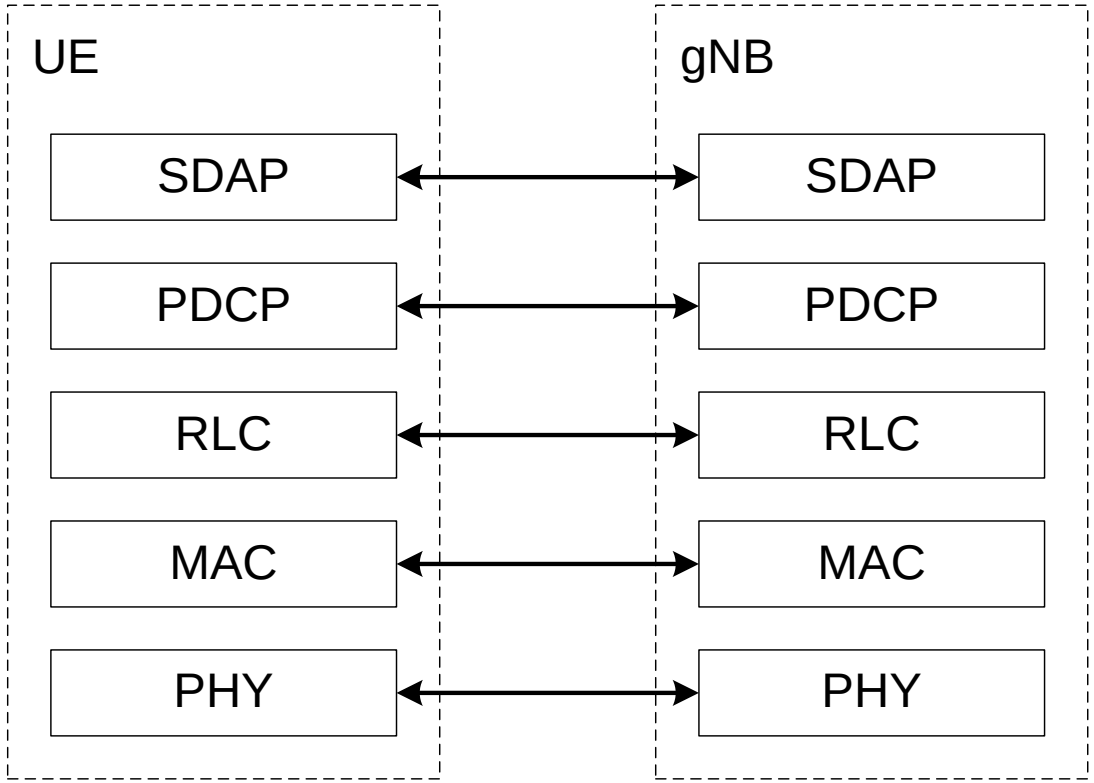
NR系统架构

- NR系统架构分为两部分：5G核心网（5GC）和5G接入网（NG-RAN）
- 5GC包括：AMF（Access and Mobility Management Function）、UPF（User Plane Funvtion）、SMF（Session Management Function）
- NG-RAN：由gNB和ng-eNB两种节点组成



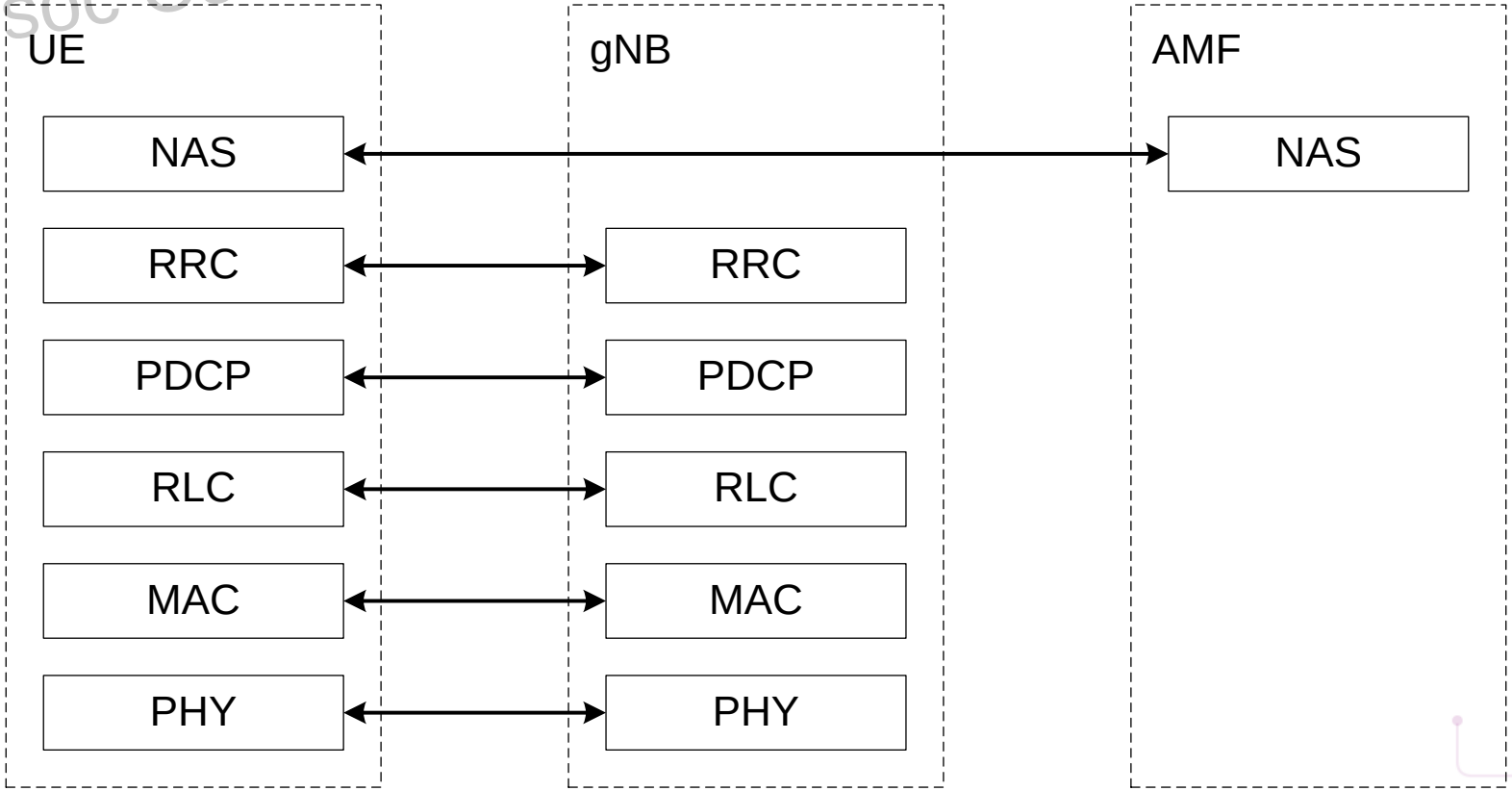
Radio Protocol Architecture

- User Plane



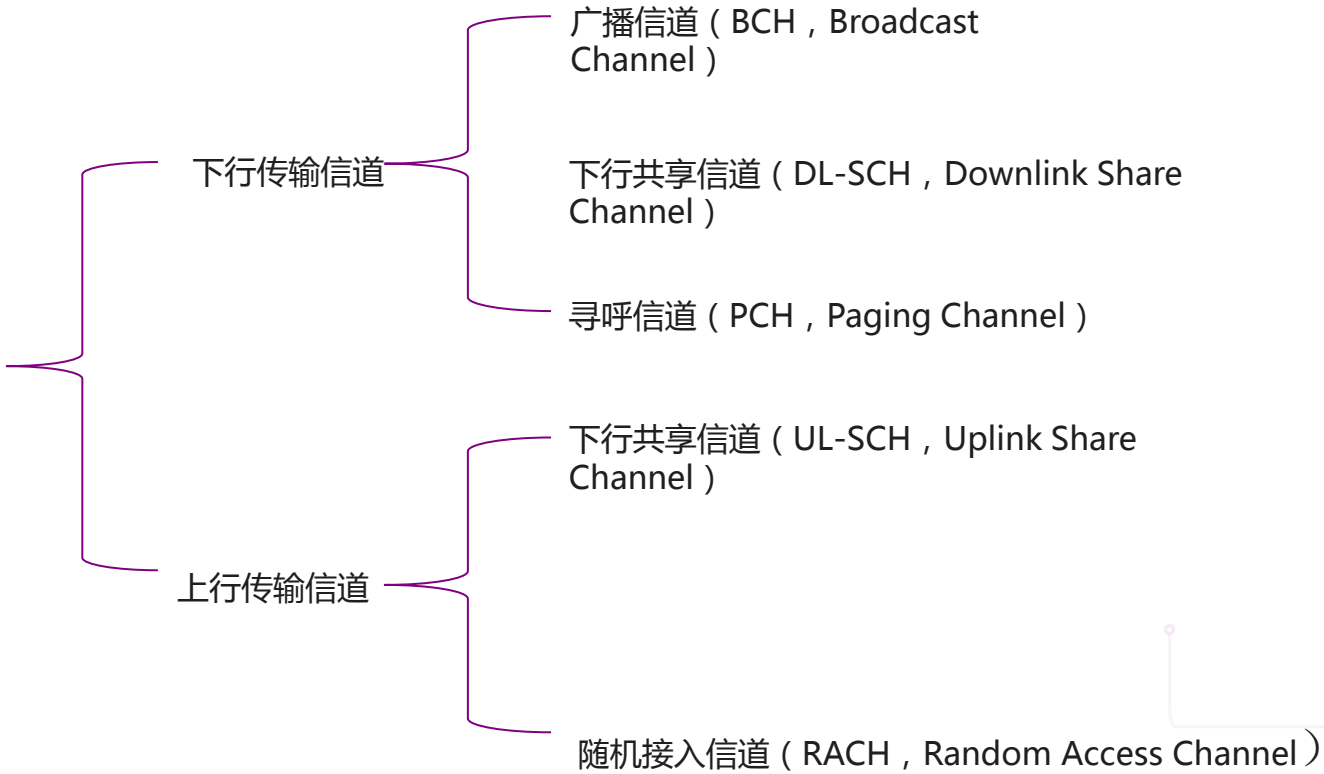
Radio Protocol Architecture

- Control Plane



Contents

- 无线接口协议栈：主要分三层、两面，三层包括物理层（L1）、数据链路层（L2）和 RRC（L3），两面是指控制面和用户面
- 物理层：通过传输信道为MAC层和高层提供信息传输服务，传输信道分为下行传输信道和上行传入信道，如下图所示。

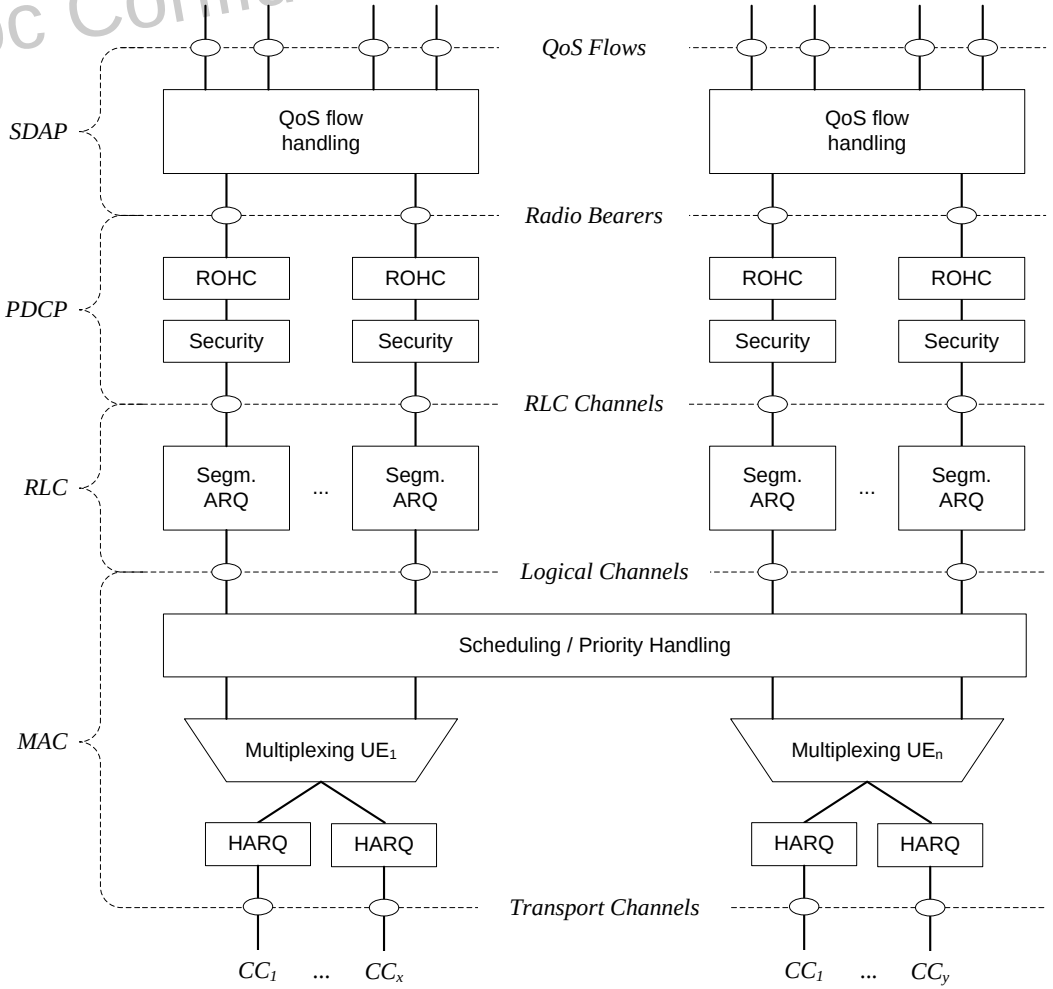


数据链路层

- 数据链路层：包括媒体接入控制（MAC，Medium Access Control）、无线链路控制（RLC，Radio Link Control）、分组数据汇聚协议（PDCP，Packet Data Convergence Protocol）和服务数据调整协议（SDAP，Service Data Adaptation Protocol）4个子层。
- 物理层为MAC子层提供传输信道级的服务，MAC子层为RLC子层提供逻辑信道级的服务，PDCP子层为SDAP提供无线承载级的服务，SDAP层为上层提供5GC QoS流级的服务。
- 无线承载分为两类：用户面的DRB和控制面的信令无线承载（SRB）

数据链路层

- 数据链路层下行架构如下图所示：



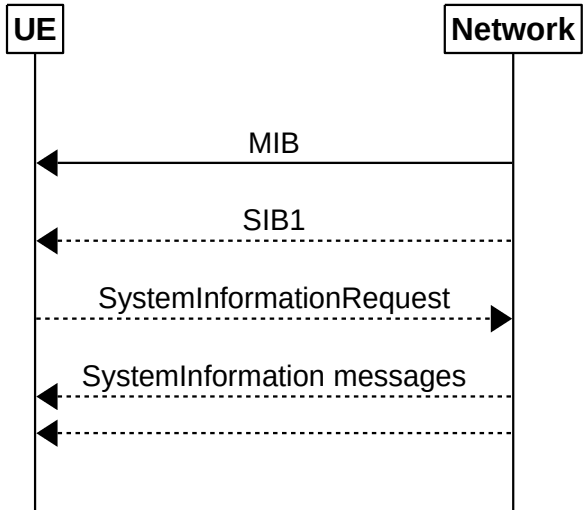
- Services and Functions

- Broadcast of System Information related to AS（接入层）and NAS（非接入层）;
- Paging initiated by 5GC or NG-RAN;
- Establishment, maintenance and release of an RRC connection between the UE and NG-RAN including
  - Addition, modification and release of carrier aggregation
  - Addition, modification and release of Dual Connectivity in NR or between E-UTRA and NR.
- Security functions including key management;
- Establishment, configuration, maintenance and release of Signalling Radio Bearers (SRBs) and Data Radio Bearers (DRBs);
- Mobility functions including:
  - Handover and context transfer;
  - UE cell selection and reselection and control of cell selection and reselection;
  - Inter-RAT（无线接入技术）mobility.
- QoS management functions;
- UE measurement reporting and control of the reporting;
- Detection of and recovery from radio link failure;
- NAS message transfer to/from NAS from/to UE.

Contents

System information acquisition

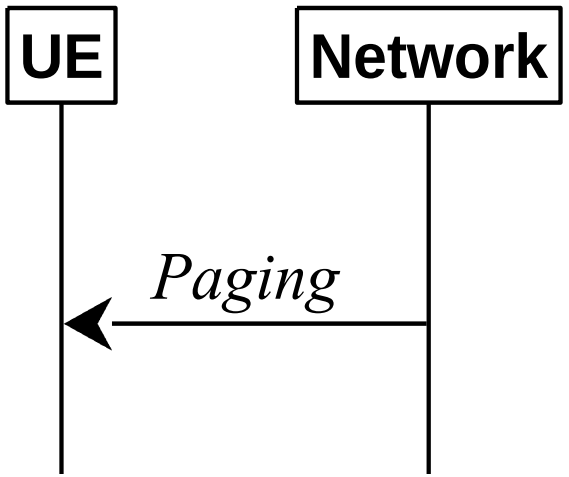
- General



- The UE applies the SI acquisition procedure to acquire the AS- and NAS information. The procedure applies to UEs in RRC_IDLE, in RRC_INACTIVE and in RRC_CONNECTED.

Paging

- General

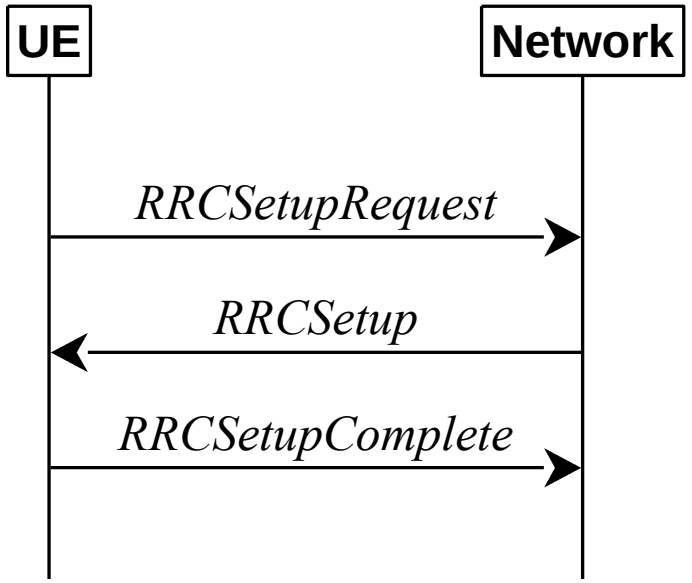


- The purpose of this procedure is:

  to transmit paging information to a UE in RRC_IDLE or RRC_INACTIVE.

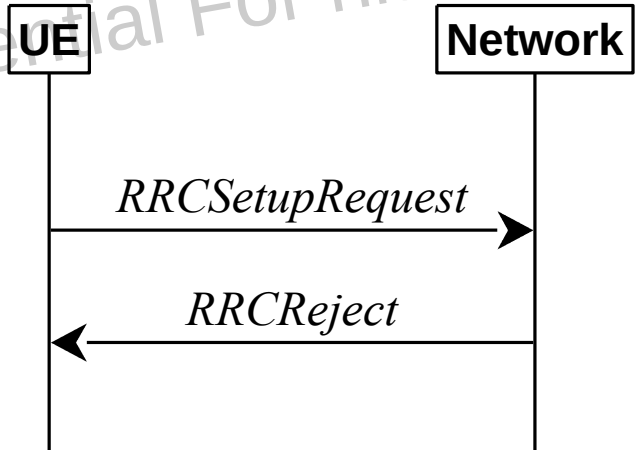
RRC connection establishment

- General



RRC connection establishment, successful

RRC connection establishment



RRC connection establishment, network reject

- The purpose of this procedure is:

establish an RRC connection. RRC connection establishment involves SRB1 establishment. The procedure is also used to transfer the initial NAS dedicated information/ message from the UE to the network.

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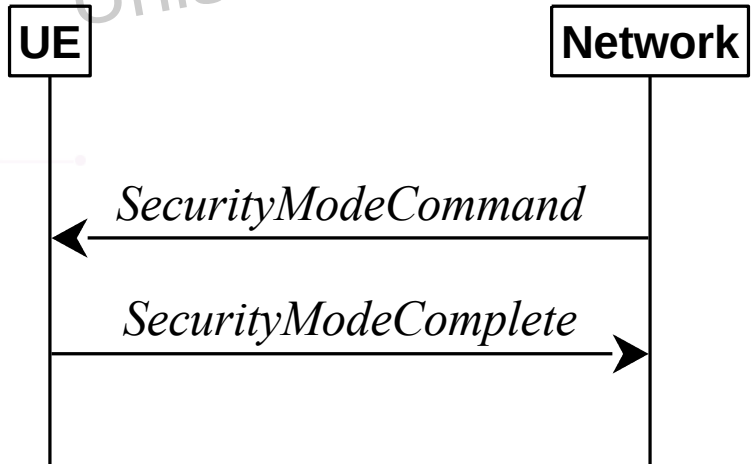
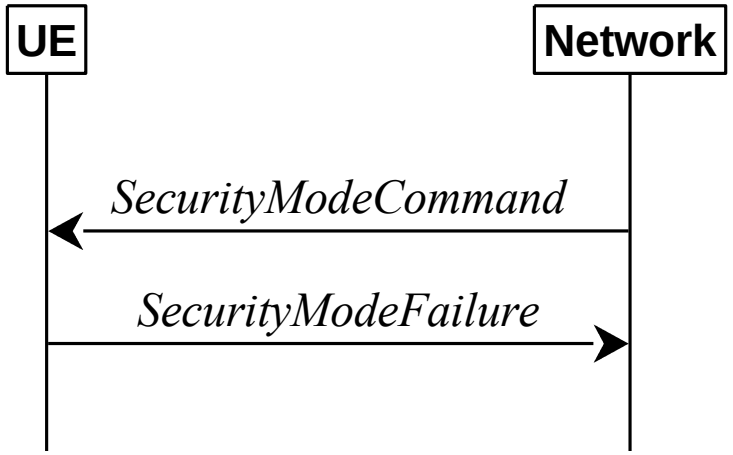
Initial AS security activation

- General



Security mode command, successful

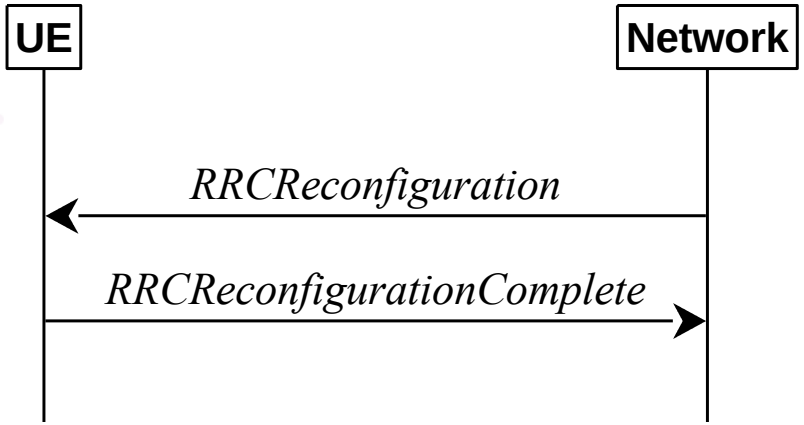


Security mode command, failure

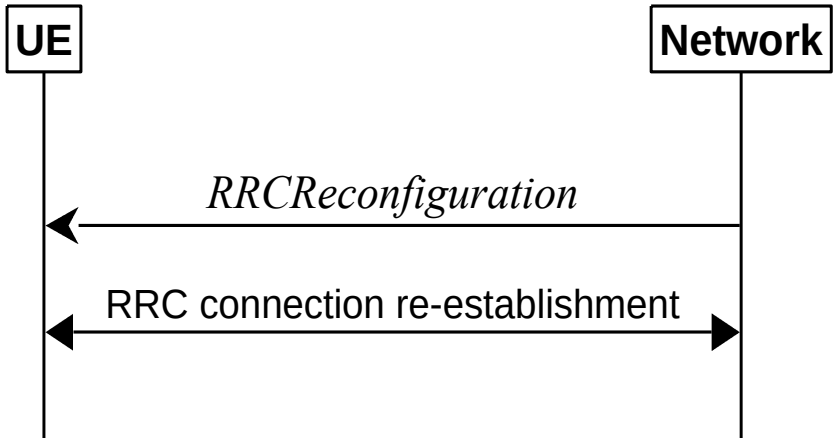
- The purpose of this procedure is to activate AS security upon RRC connection establishment.

RRC reconfiguration

- General



RRC reconfiguration, successful



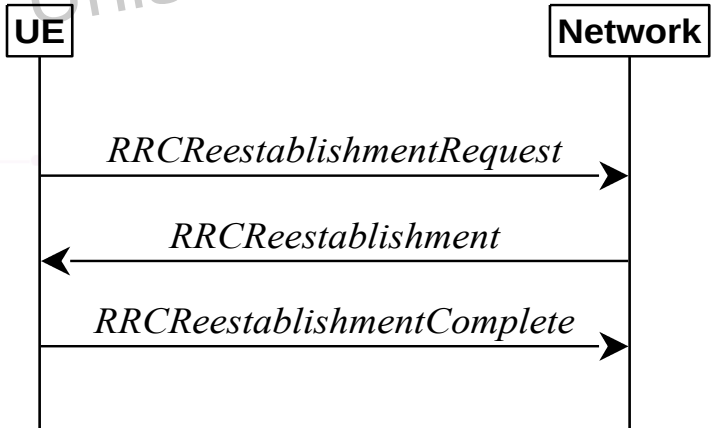
RRC reconfiguration, failure

- The purpose of this procedure is:

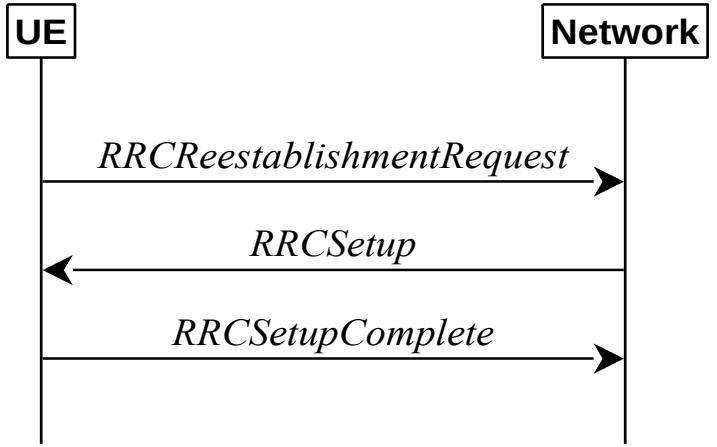
to modify an RRC connection, e.g. to establish/modify/release RBs, to perform reconfiguration with sync, to setup/modify/release measurements, to add/modify/release SCells and cell groups. As part of the procedure, NAS dedicated information may be transferred from the Network to the UE

RRC connection re-establishment

- General



RRC connection re-establishment, successful



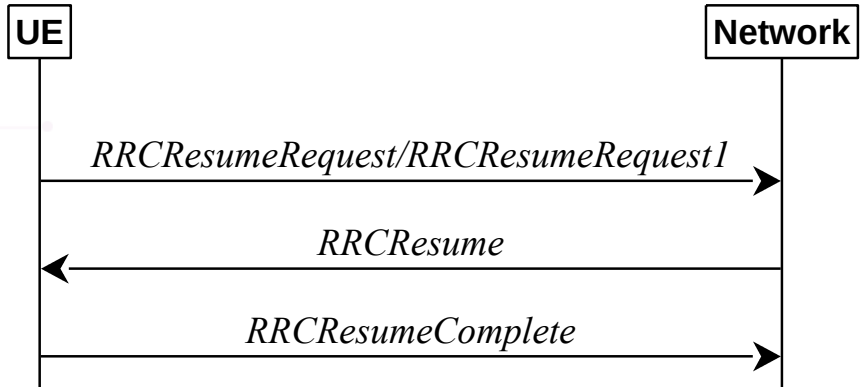
RRC re-establishment, fallback to RRC establishment, successful

- The purpose of this procedure is:

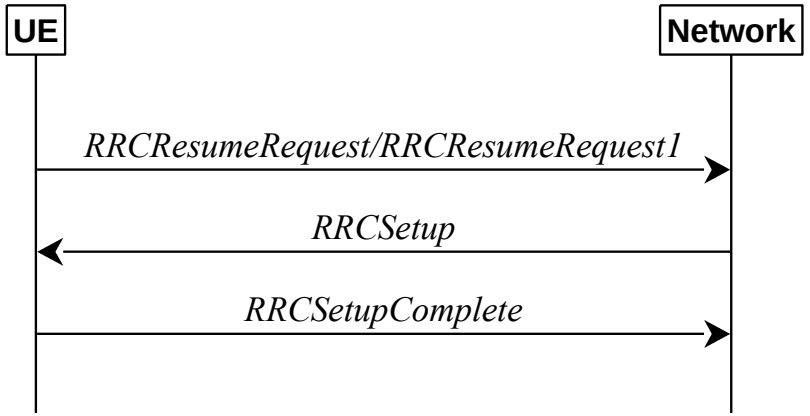
to re-establish the RRC connection. A UE in RRC_CONNECTED, for which AS security has been activated with SRB2 and at least one DRB setup, may initiate the procedure in order to continue the RRC connection. The connection re-establishment succeeds if the network is able to find and verify a valid UE context or, if the UE context cannot be retrieved, and the network responds with an RRCSetup according

RRC connection resume

- General



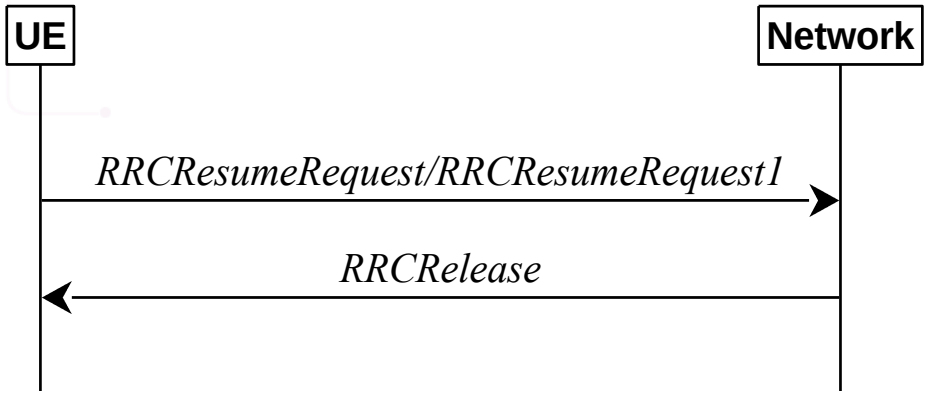
RRC connection resume, successful



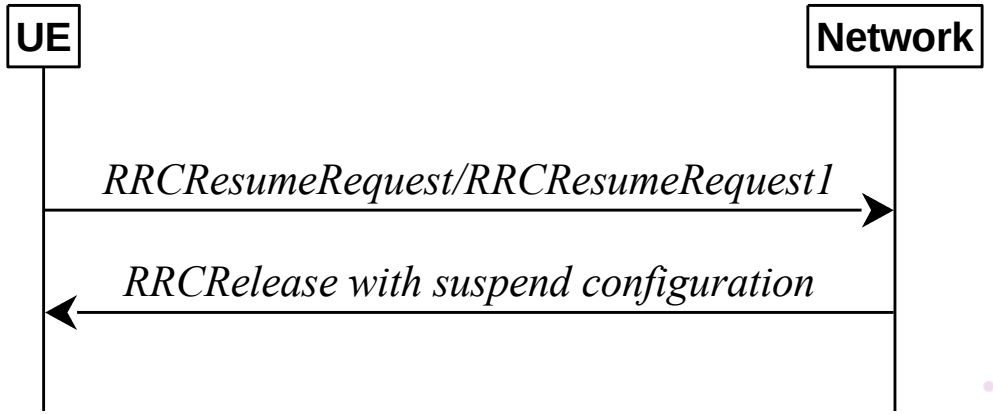
RRC connection resume fallback to RRC connection establishment, successful

RRC connection resume

- General



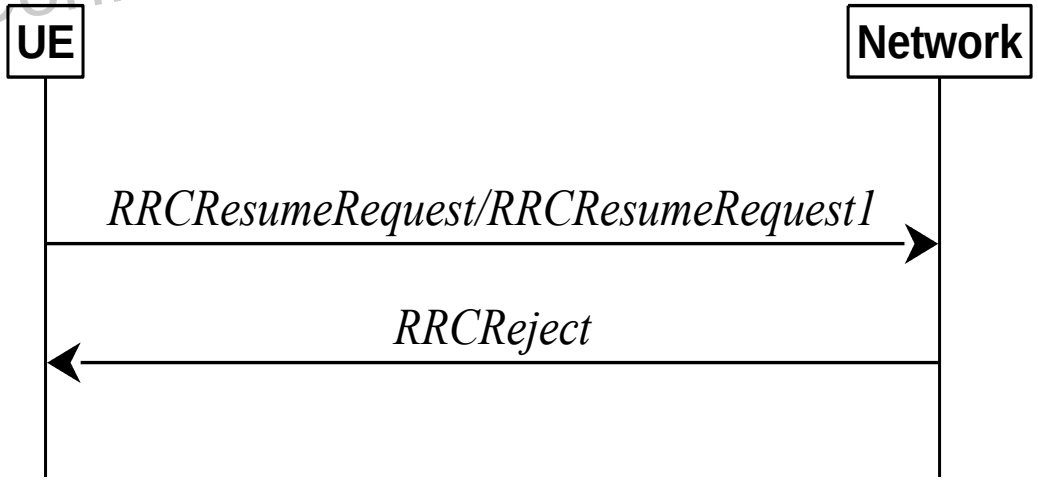
RRC connection resume followed by network release, successful



RRC connection resume followed by network suspend, successful

RRC connection resume

- General



RRC connection resume, network reject

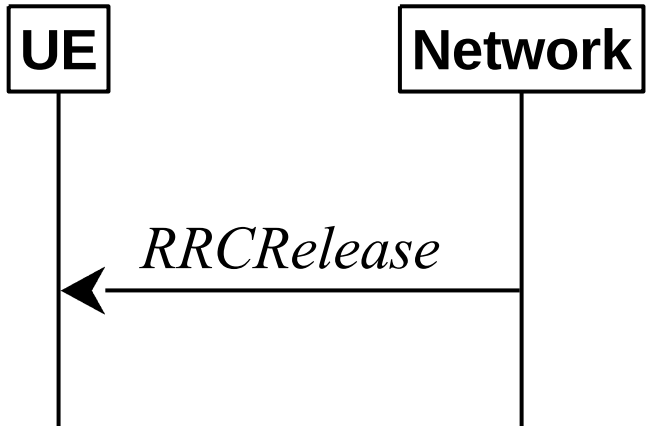
- The purpose of this procedure is:

to resume a suspended RRC connection, including resuming SRB(s) and DRB(s) or perform an RNA update.

The UE initiates the procedure when upper layers or AS (when responding to RAN paging or upon triggering RNA updates while the UE is in RRC_INACTIVE) requests the resume of a suspended RRC connection

RRC connection release

- General



RRC connection release, successful

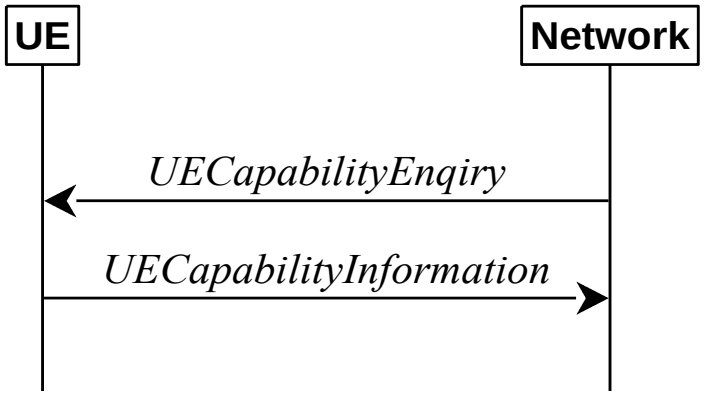
- The purpose of this procedure is:

to release the RRC connection, which includes the release of the established radio bearers as well as all radio resources; or

to suspend the RRC connection only if SRB2 and at least one DRB are setup, which includes the suspension of the established radio bearers.

UE capabilities

- General



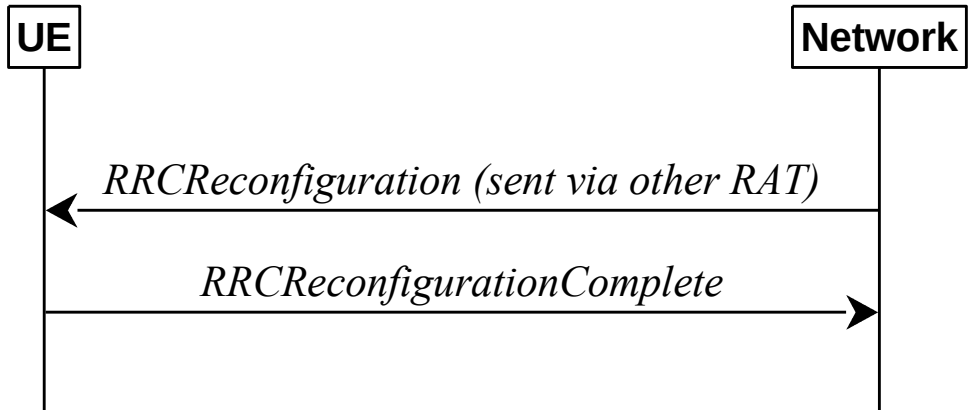
UE capability transfer

- The purpose of this procedure is:

The network initiates the procedure to a UE in RRC_CONNECTED when it needs (additional) UE radio access capability information.

Handover to NR

- General



Handover to NR, successful

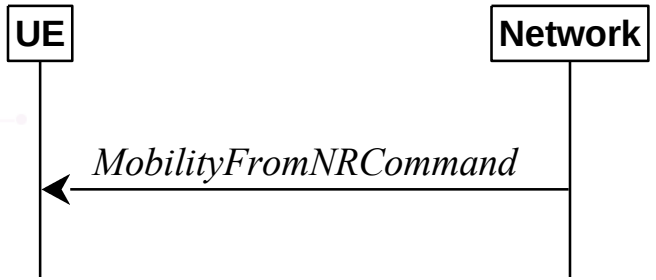
- The purpose of this procedure is:

under the control of the network, transfer a connection between the UE and another Radio Access Network (e.g. E-UTRAN) to NR.

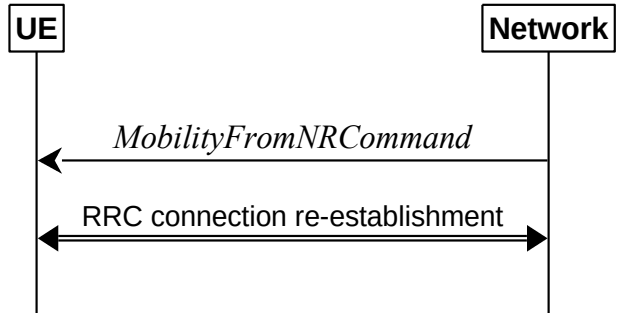
The handover to NR procedure applies when SRBs, possibly in combination with DRBs, are established in another RAT. Handover from E-UTRA to NR applies only after integrity has been activated in E-UTRA.

Mobility from NR

- General



Mobility from NR, successful



Mobility from NR, failure

- The purpose of this procedure is:

  to move a UE in RRC_CONNECTED to a cell using other RAT, e.g. E-UTRA

- Initiation:

The network initiates the mobility from NR procedure to a UE in RRC_CONNECTED, possibly in response to a MeasurementReport message, by sending a MobilityFromNRCommand message.

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