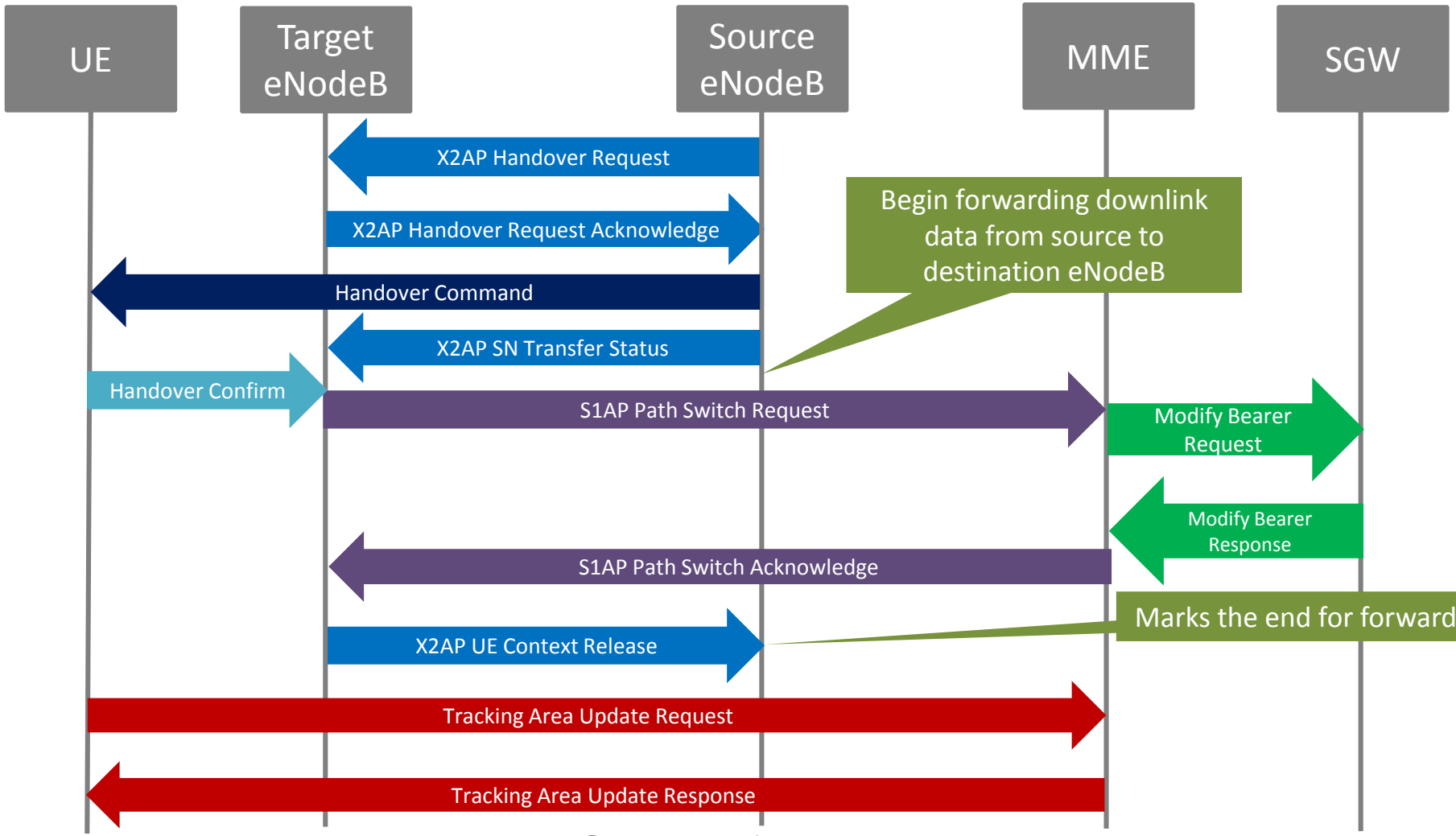
# LTE X2 Handover Messaging

# LTE X2 Handover Sequence Diagram

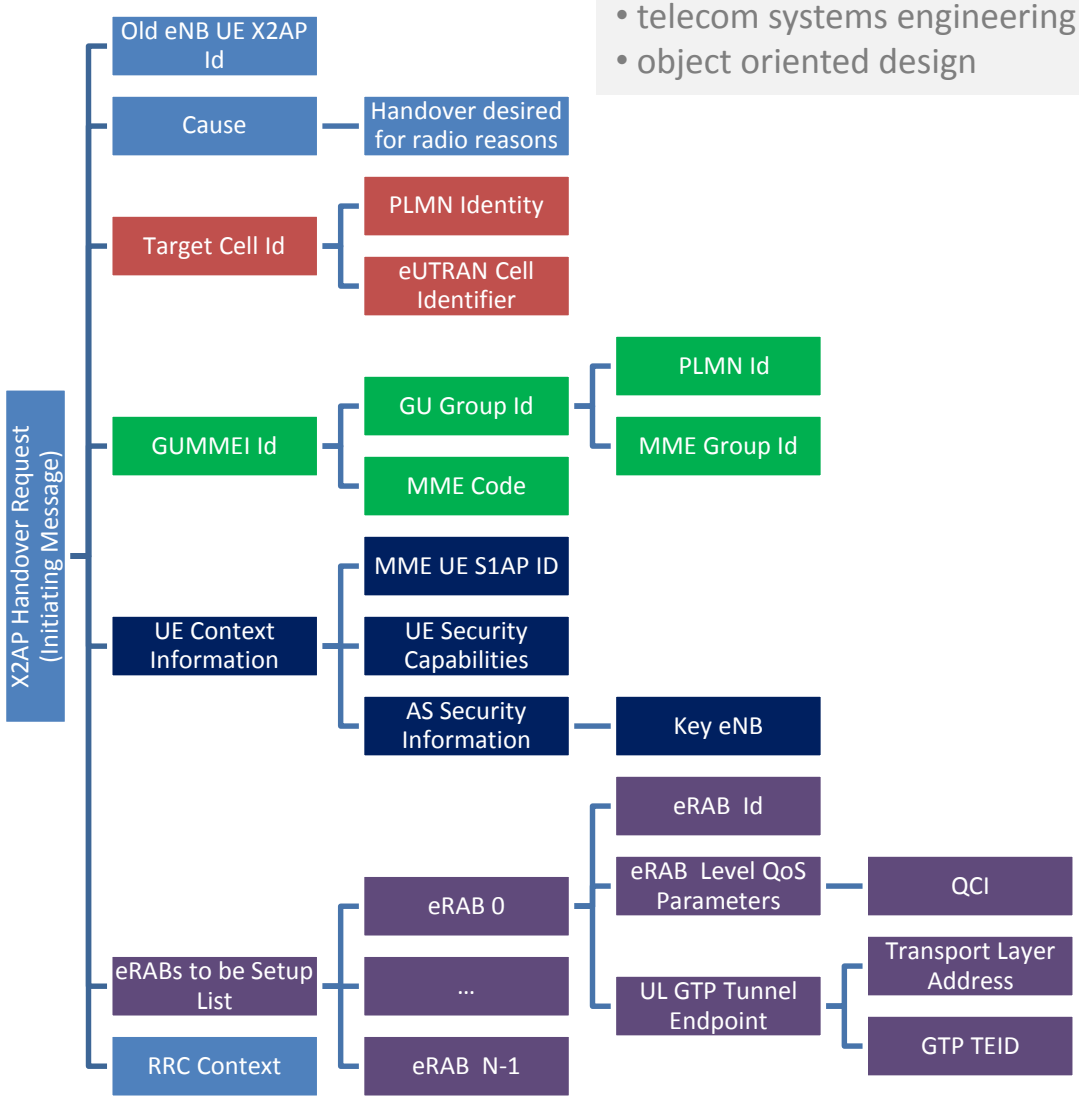




## Source eNodeB → Target eNodeB

## X2AP Handover Request

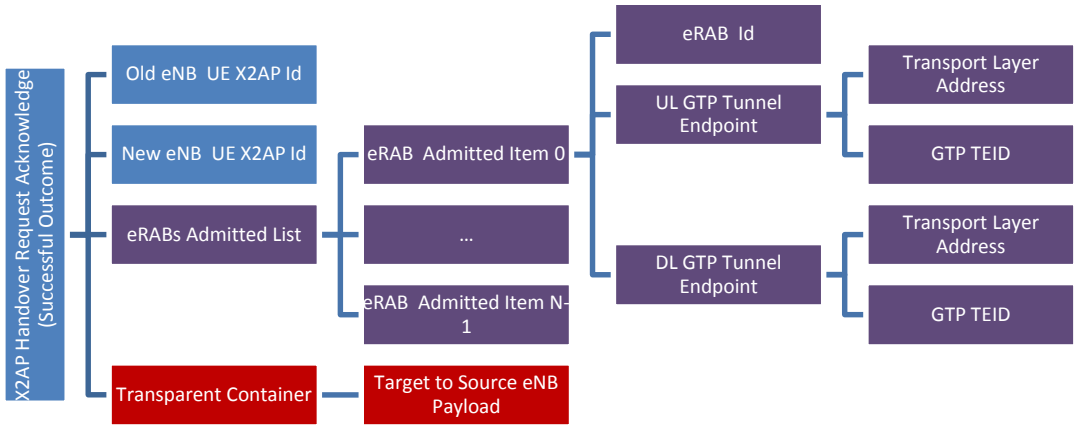
- eNodeB decides to initiate an X2 handover based on:
  - UE reported RRC downlink signal quality measurements
  - Uplink signal quality measured at the eNodeB
- eNodeB picks the target cell id for the handover.
- X2 handover is initiated if the If the target cell is served by the same MME as the current cell
- The message includes UE context information that identifies the UE on the S1AP interface.
  - Security parameters are also included in the message
- Information about the radio bearers is included in the message. The per RAB information includes
  - QoS parameters
  - GTP Tunnel Information
- The message also includes RRC context information



## Target eNodeB → Source eNodeB

# X2AP Handover Request Acknowledge

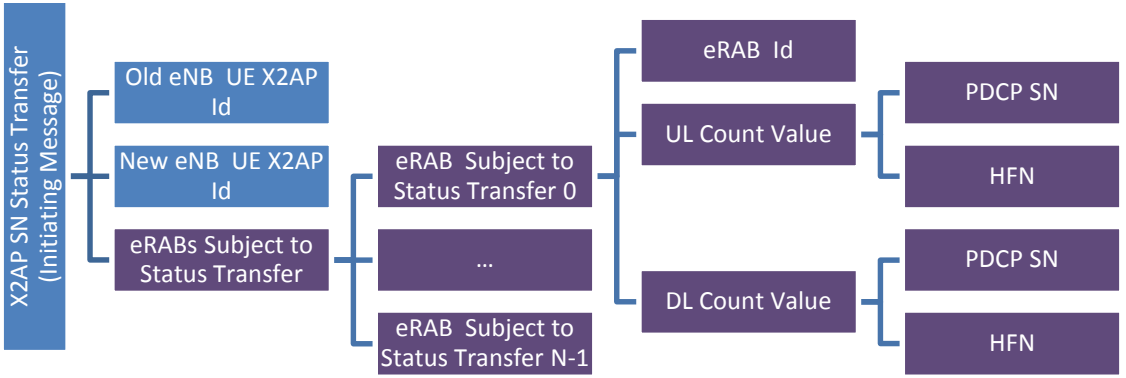
- The target eNodeB receives performs admission control on receipt of the Handover Request.
- The target eNodeB responds with X2AP Handover Request Acknowledge.
- Information about the accepted RABs is included in the message.
  - The Uplink and Downlink GTP Tunnel information is included for each RAB.
  - The tunnel assignments are made at the target to transport traffic during the handover.
- A Handover Command message sent via a transparent container.
  - The source eNodeB send this message to the UE.



# Source eNodeB → Target eNodeB

## X2AP SN Transfer Status

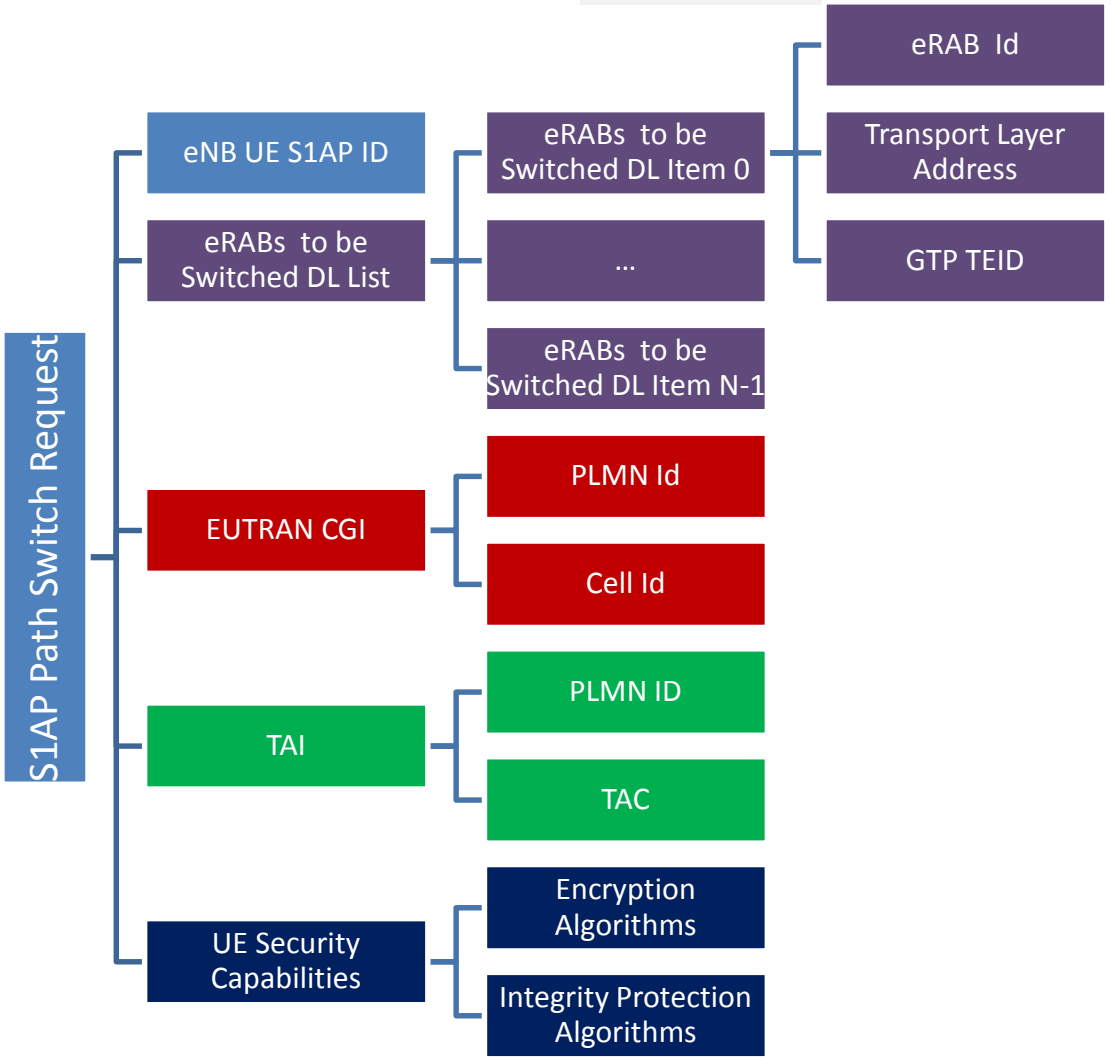
- The source eNodeB now sends the SN Transfer Status
- The following fields are present for each RAB
  - The uplink PDCP sequence number
  - Uplink Hyper Frame Number
  - The downlink PDCP sequence number
  - Downlink Hyper Frame Number
- These fields are needed for continuing ciphering and integrity protection after the handover.



# Target eNodeB → MME

## S1AP Path Switch Request

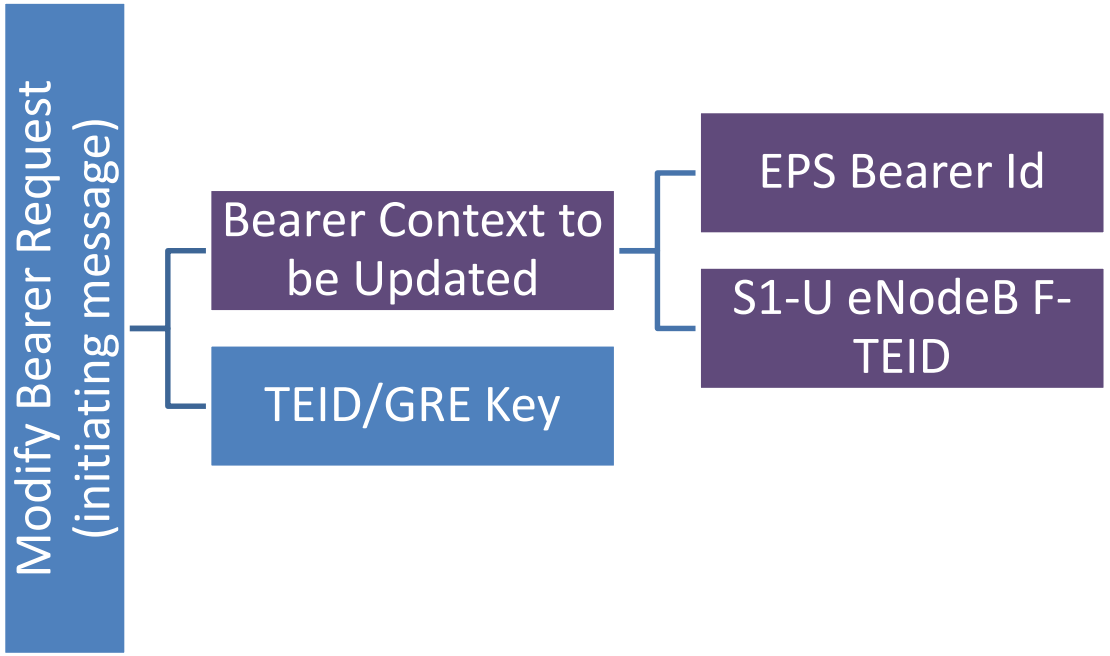
- The target eNodeB requests switching of the S1-U GTP tunnel towards the target eNodeB.
- The MME identifies the UE with the “eNB to UE S1AP ID”
- The message includes the new cell id and the tracking area id
- Security capabilities of the target eNodeB are also included.



## MME → SGW

## Modify Bearer Request

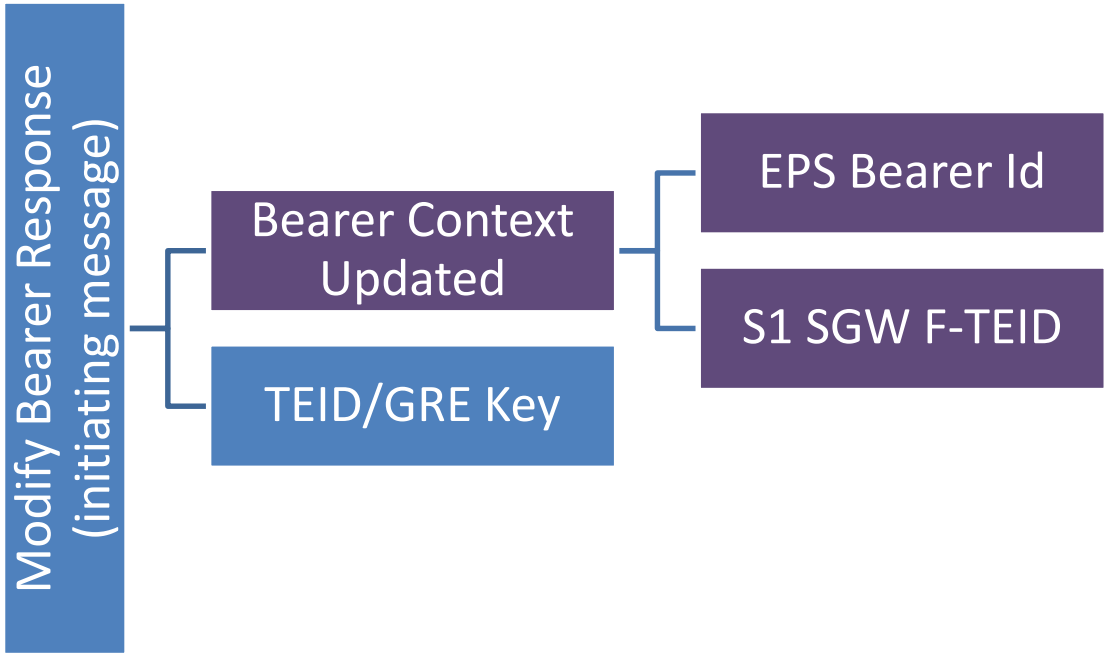
- The MME requests the SGW to switch the path to the target eNodeB.
- The S1-U TEID received from the target eNodeB is passed to the SGW.



## SGW → MME

## Modify Bearer Response

- SGW updates the bearer and responds back



## S1AP: MME→ Target eNodeB

## S1AP Path Switch Acknowledge

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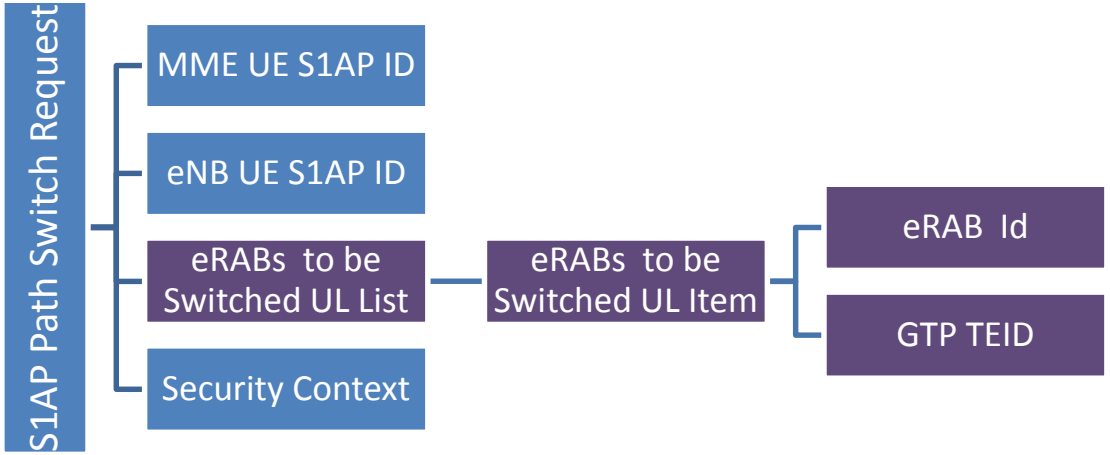
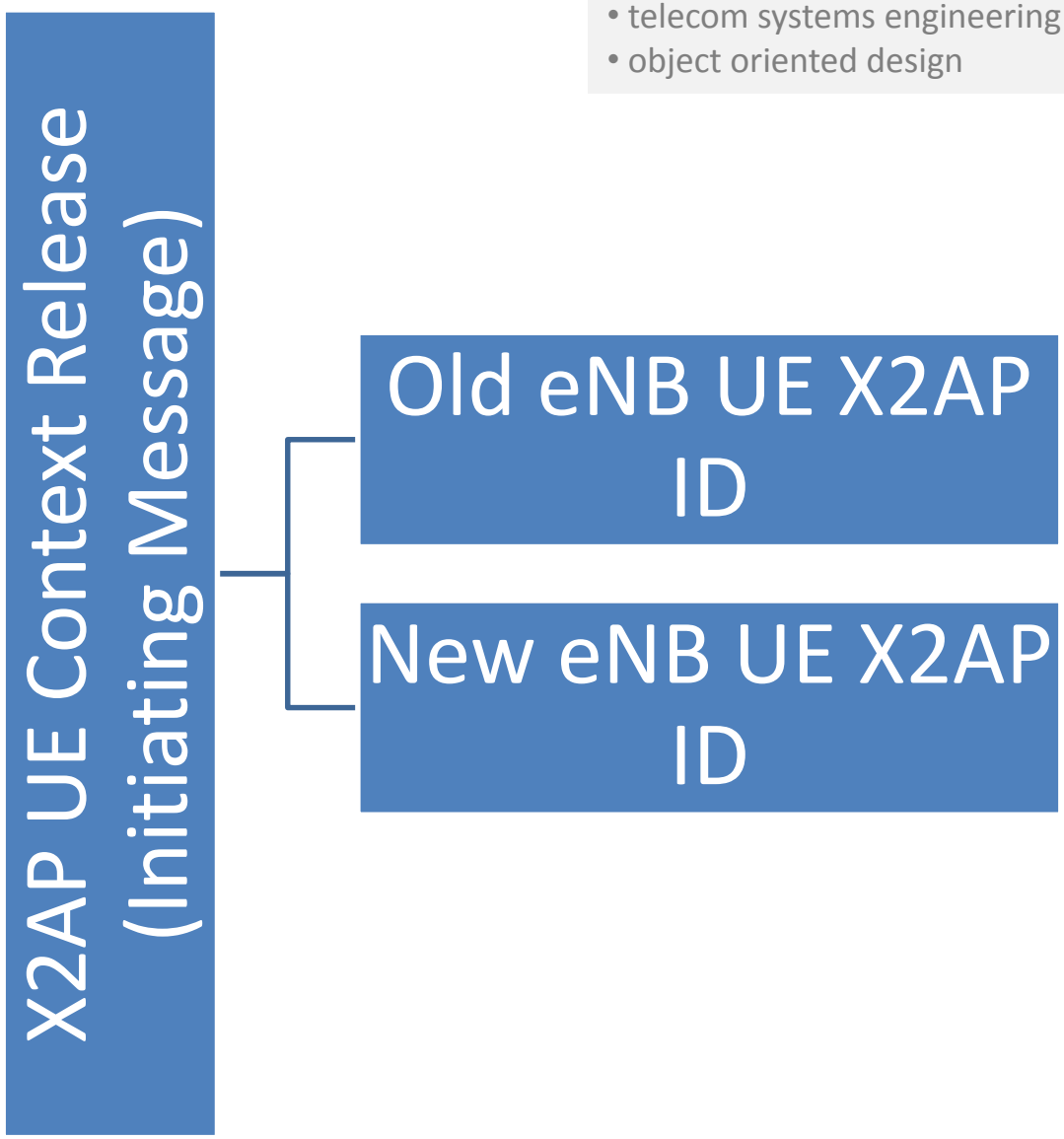


**Target eNodeB →**
**Source eNodeB**

## X2AP UE Context Release

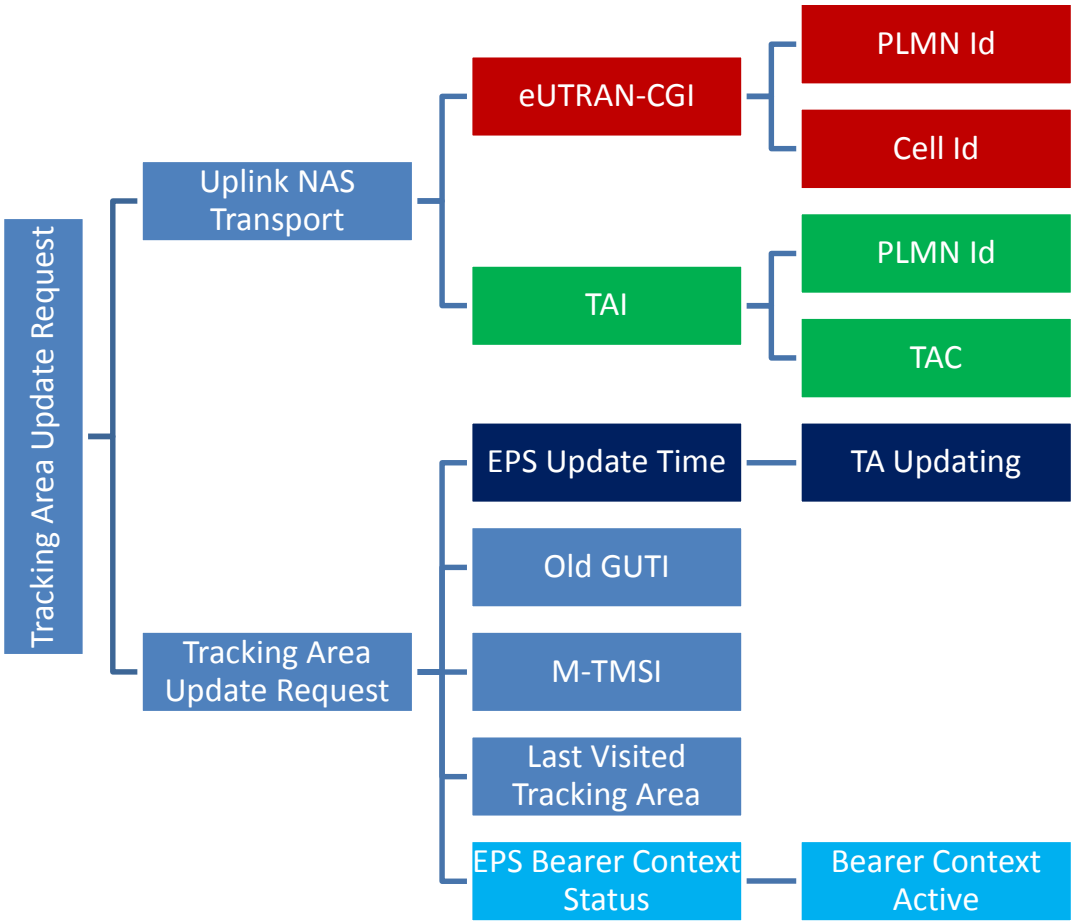
- Sent when the target eNodeB has successfully completed the path switching and radio signaling for the handover.



# UE-NAS → MME-NAS

## Tracking Area Update Request

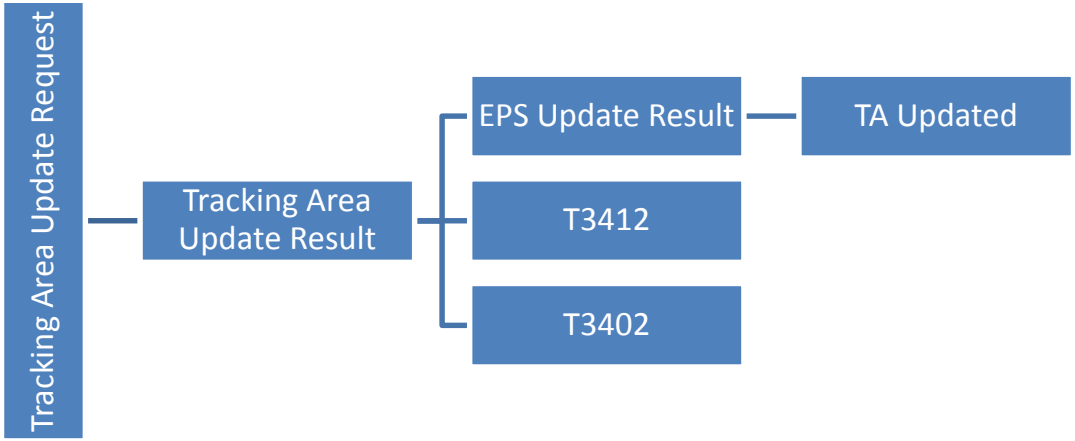
- Sent if the just completed handover resulted in a Tracking Area Update



# MME-NAS → UE-NAS

## Tracking Area Update Accept

- Sent if the just completed handover resulted in a Tracking Area Update



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