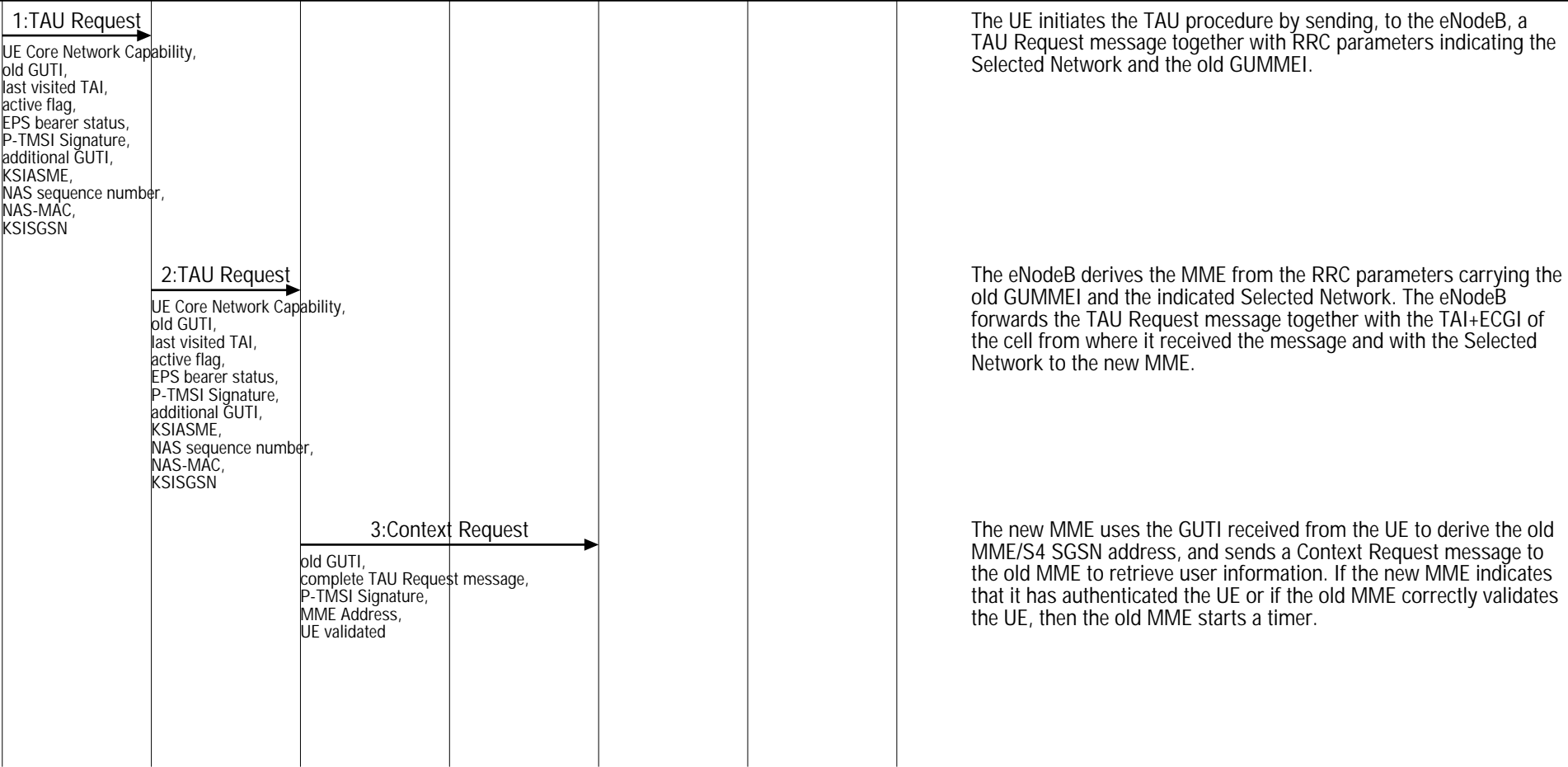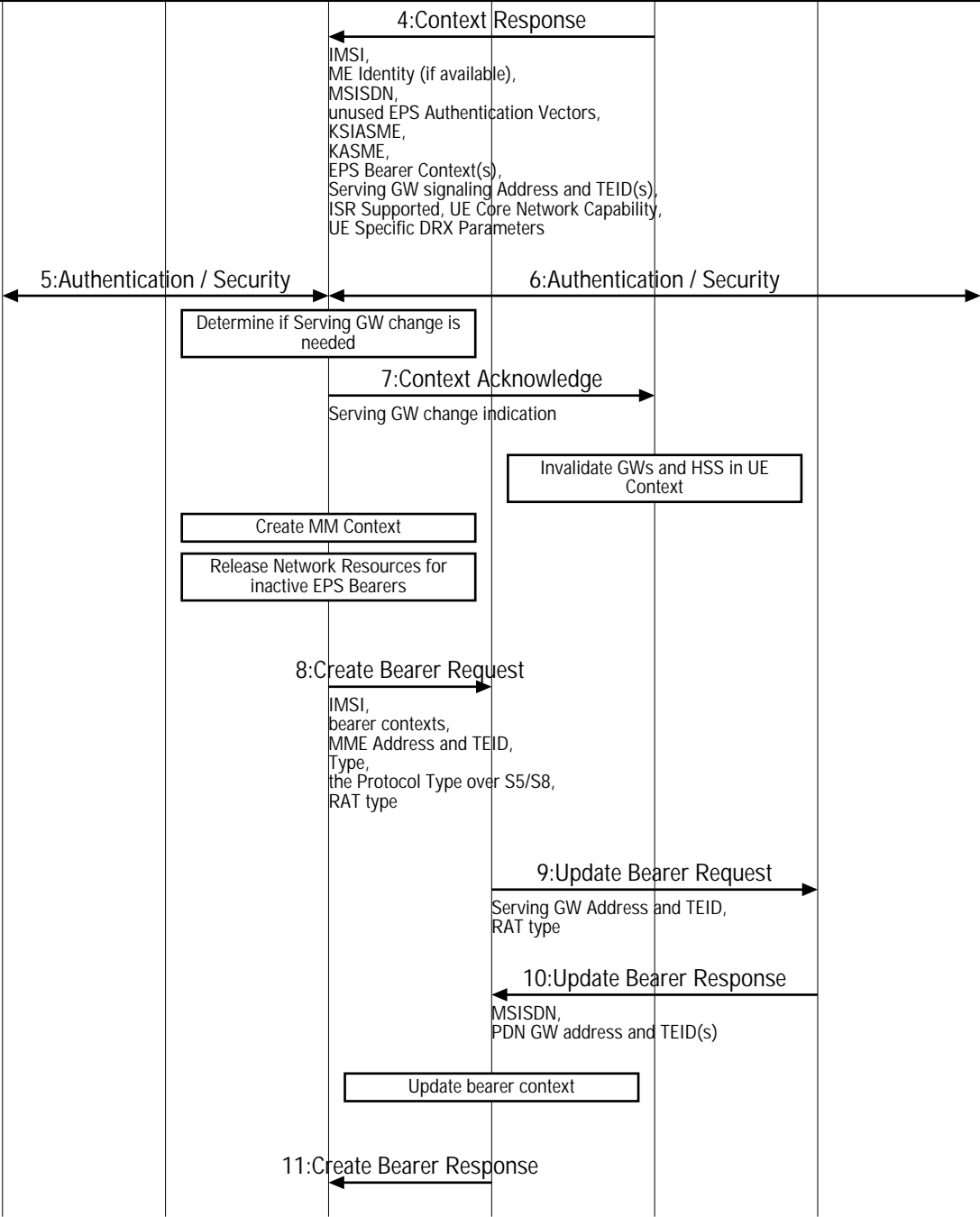# Long Term Evolution (LTE) Tracking Area Update (Moving from Old to New MME (Serving GW Change))

Cell Sites	LTE/SAE						EventStudio System Designer 4.0
Cell	New E-UTRAN	New EPC		Old EPC	CN		
UE	eNodeB	New MME	New Serving GW	Old MME	PDN GW	HSS	01-Mar-09 16:14 (Page 1)

A Tracking Area Update takes place if:

- UE detects it has entered a new Tracking Area that is not in the list of TAIs that the UE registered with the network;

- the periodic Tracking Area update timer has expired;

- UE was in UTRAN PMM_Connected state (e.g. URA_PCH) when it reselects to E UTRAN;

- UE was in GPRS READY state when it reselects to E UTRAN;

- the TIN indicates "P-TMSI" when the UE reselects to E-UTRAN (e.g. due to bearer configuration modifications performed on GERAN/UTRAN);

- the RRC connection was released with release cause "load re-balancing TAU required";

- a change of the UE Core Network Capability and/or UE Specific DRX Parameters information of the UE.

1:TAU Request
UE Core Network Capability,
old GUTI,
last visited TAI,
active flag,
EPS bearer status,
P-TMSI Signature,
additional GUTI,
KSIASME,
NAS sequence number,
NAS-MAC,
KSISGSN

The UE initiates the TAU procedure by sending, to the eNodeB, a TAU Request message together with RRC parameters indicating the Selected Network and the old GUMMEI.

2:TAU Request
UE Core Network Capability,
old GUTI,
last visited TAI,
active flag,
EPS bearer status,
P-TMSI Signature,
additional GUTI,
KSIASME,
NAS sequence number,
NAS-MAC,
KSISGSN

The eNodeB derives the MME from the RRC parameters carrying the old GUMMEI and the indicated Selected Network. The eNodeB forwards the TAU Request message together with the TAI+ECGI of the cell from where it received the message and with the Selected Network to the new MME.

3:Context Request
old GUTI,
complete TAU Request message,
P-TMSI Signature,
MME Address,
UE validated

The new MME uses the GUTI received from the UE to derive the old MME/S4 SGSN address, and sends a Context Request message to the old MME to retrieve user information. If the new MME indicates that it has authenticated the UE or if the old MME correctly validates the UE, then the old MME starts a timer.

Cell Sites		LTE/SAE					EventStudio System Designer 4.0
Cell	New E-UTRAN	New EPC		Old EPC	CN		
UE	eNodeB	New MME	New Serving GW	Old MME	PDN GW	HSS	01-Mar-09 16:14 (Page 2)

4:Context Response

IMSI,
ME Identity (if available),
MSISDN,
unused EPS Authentication Vectors,
KSIASME,
KASME,
EPS Bearer Context(s),
Serving GW signaling Address and TEID(s),
ISR Supported, UE Core Network Capability,
UE Specific DRX Parameters

The old MME responds with a Context Response message. The PDN GW Address and TEID(s) (for GTP-based S5/S8) or GRE Keys (PMIP-based S5/S8 at the PDN GW(s) for uplink traffic) and the TI(s), is part of the EPS Bearer Context. ISR Supported is indicated if the old MME is capable to activate ISR for the UE. The MSISDN is included if the old MME has it stored for that UE.

5:Authentication / Security   **6:Authentication / Security**

Authentication and security functions are performed.

Determine if Serving GW change is needed

The new MME determines to relocate the Serving GW as the old Serving GW cannot continue to serve the UE.

7:Context Acknowledge

Serving GW change indication

The new MME sends a Context Acknowledge message to the old MME. Serving GW change indication indicates a new Serving GW has been selected.

Invalidate GWs and HSS in UE Context

The old MME marks in its UE context that the information in the GWs and the HSS are invalid.

Create MM Context

The MME constructs an MM context for the UE.

Release Network Resources for inactive EPS Bearers

The MME verifies the EPS bearer status received from the UE with the bearer contexts received from the old MME and releases any network resources related to EPS bearers that are not active in the UE.

8:Create Bearer Request

IMSI,
bearer contexts,
MME Address and TEID,
Type,
the Protocol Type over S5/S8,
RAT type

Since the new MME selected a new Serving GW it sends a Create Bearer Request message to the selected new Serving GW. The PDN GW address is indicated in the bearer Contexts. Type indicates to the Serving GW to send the Update Bearer Request the PDN GW. The Protocol Type specifies the protocol to be used over S5/S8 interface. RAT type indicates a change in radio access. If the PDN GW requested UE's location info, the MME also includes the User Location Information IE in this message.

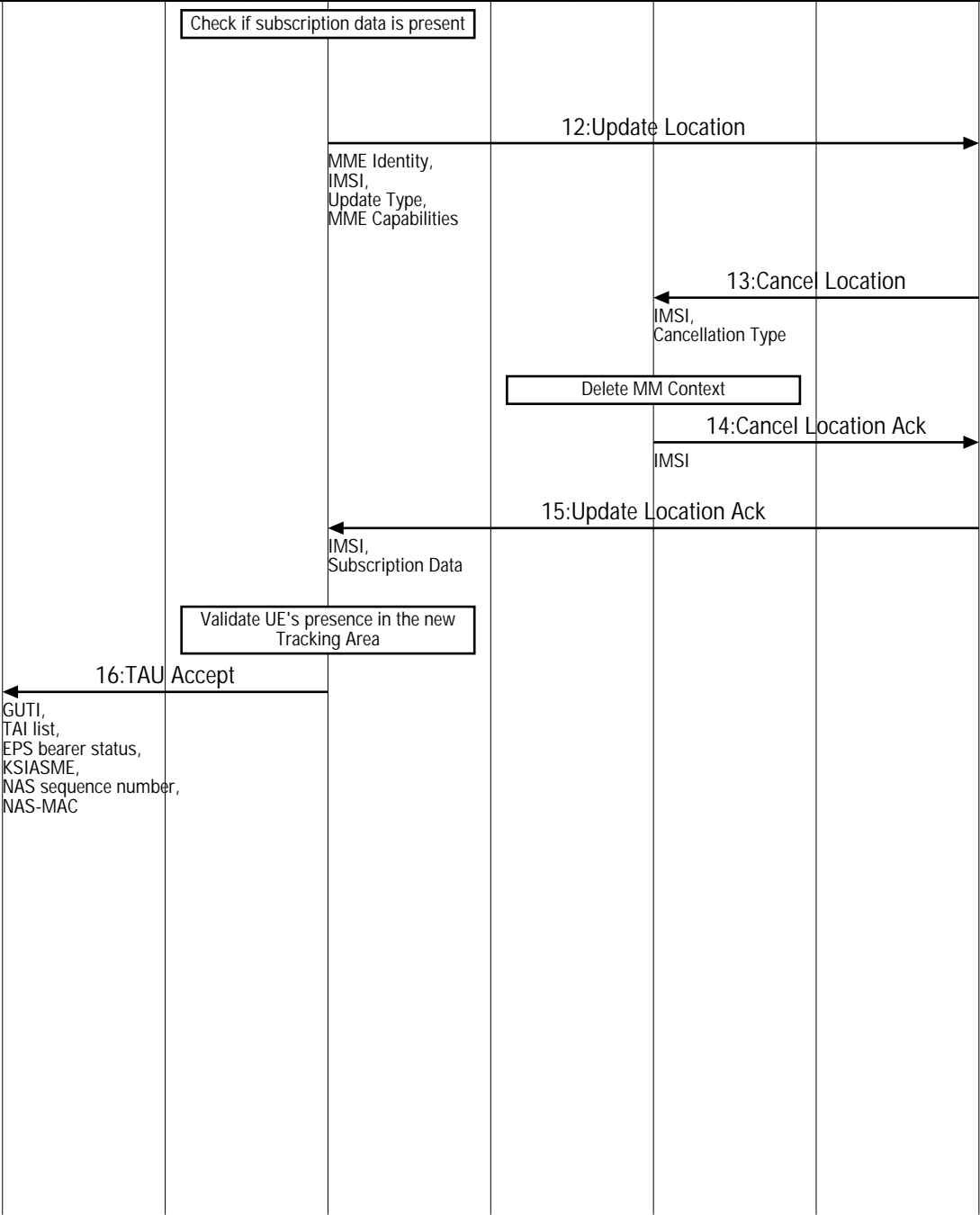**9:Update Bearer Request**

Serving GW Address and TEID,
RAT type

The Serving GW informs the PDN GW about the changes. The radio access type is included in the message. User Location Information IE may also included.

10:Update Bearer Response

MSISDN,
PDN GW address and TEID(s)

The PDN GW updates its bearer contexts and returns an Update Bearer Response message. The MSISDN is included if the PDN GW has it stored in its UE context.

Update bearer context

The Serving GW updates its bearer context. This allows the Serving GW to route bearer PDUs to the PDN GW when received from eNodeB.

11:Create Bearer Response

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Check if subscription data is present

The new MME verifies whether it holds subscription data for the UE identified by the GUTI, the additional GUTI or by the IMSI received with the context data from the old CN node. No subscription data is found.

12:Update Location

MME Identity,
IMSI,
Update Type,
MME Capabilities

Since there is no subscription data in the new MME for this UE, the new MME sends an Update Location Request message to the HSS. Update Type indicates that only the MME registration shall be updated in HSS. Update Type indicates whether HSS should cancel location to the other RAT as well. The MME capabilities indicate the MME's support for regional access restrictions functionality.

13:Cancel Location

IMSI,
Cancellation Type

The HSS sends the message Cancel Location to the old MME with Cancellation Type set to Update Procedure.

Delete MM Context

Delete the mobility management context on the old MME.

14:Cancel Location Ack

IMSI

The old MME acknowledges with the message Cancel Location Ack.

15:Update Location Ack

IMSI,
Subscription Data

The HSS acknowledges the Update Location Request message by sending an Update Location Ack message to the new MME.

Validate UE's presence in the new Tracking Area

The new MME validates the UE's presence in the (new) TA. There is no access restriction, so allow the tracking area update to go ahead.

16:TAU Accept

GUTI,
TAI list,
EPS bearer status,
KSIASME,
NAS sequence number,
NAS-MAC

The MME sends a TAU Accept message to the UE. GUTI is included if the MME allocates a new GUTI. If the "active flag" is set in the TAU Request message the user plane setup procedure can be activated in conjunction with the TAU Accept message.