



CS Fallback Solution Introduction in EPC_LTE

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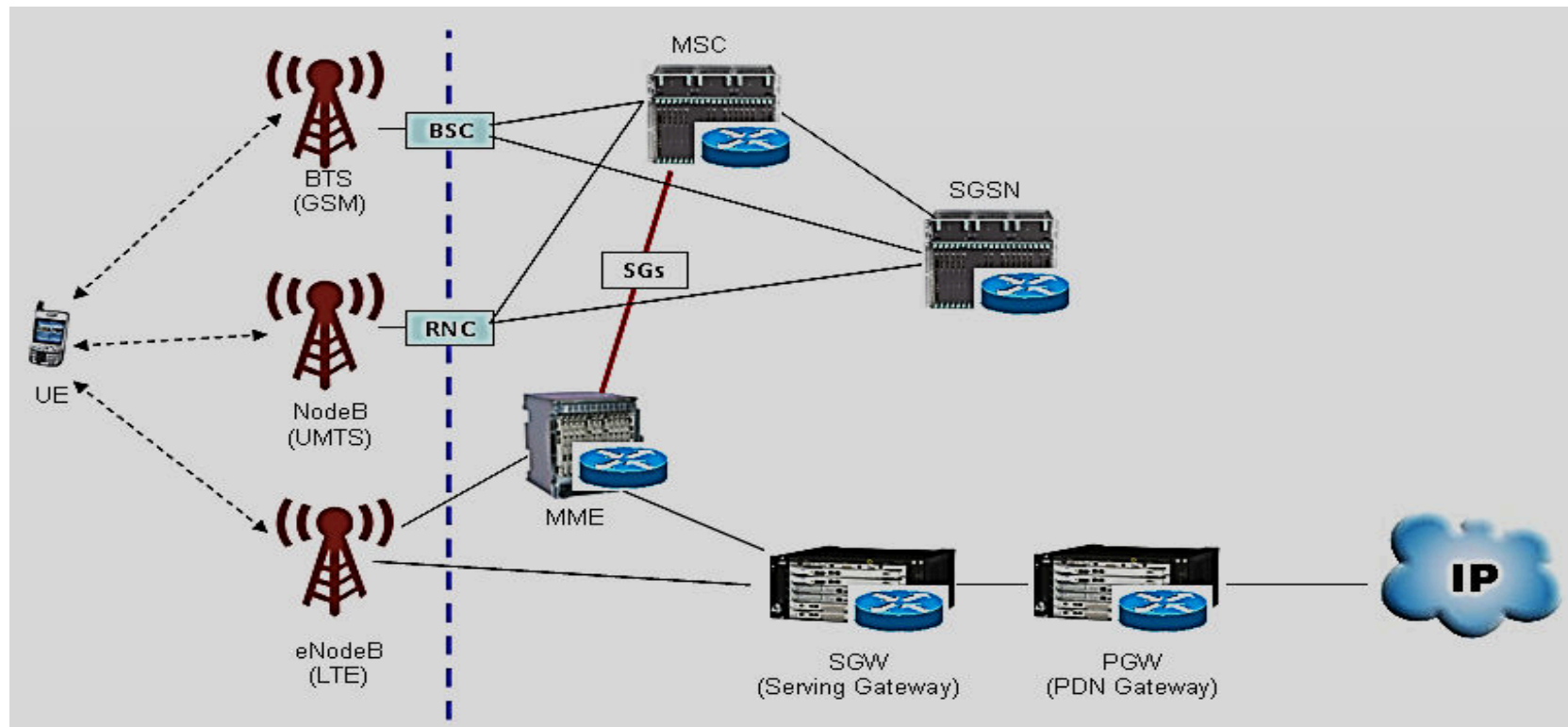
Properties of CSFB Deployment

Originally LTE was seen as a completely IP cellular system just for carrying data, so in the initial state of LTE , CSFB needed by:

- I. Telecom operators to provide voice and SMS service as a transition solution.
- II. UE side which are voice centric and can't support IMS and VOLTE solution.
- III. CSFB is easy and fast to deploy with low cost and smooth evolution.
- IV. With CSFB there are some drawbacks as well ,when UE is in legacy network during the voice call it does not have access to fast PS services ,along with that call setup time takes more time usually around 3-5 seconds.

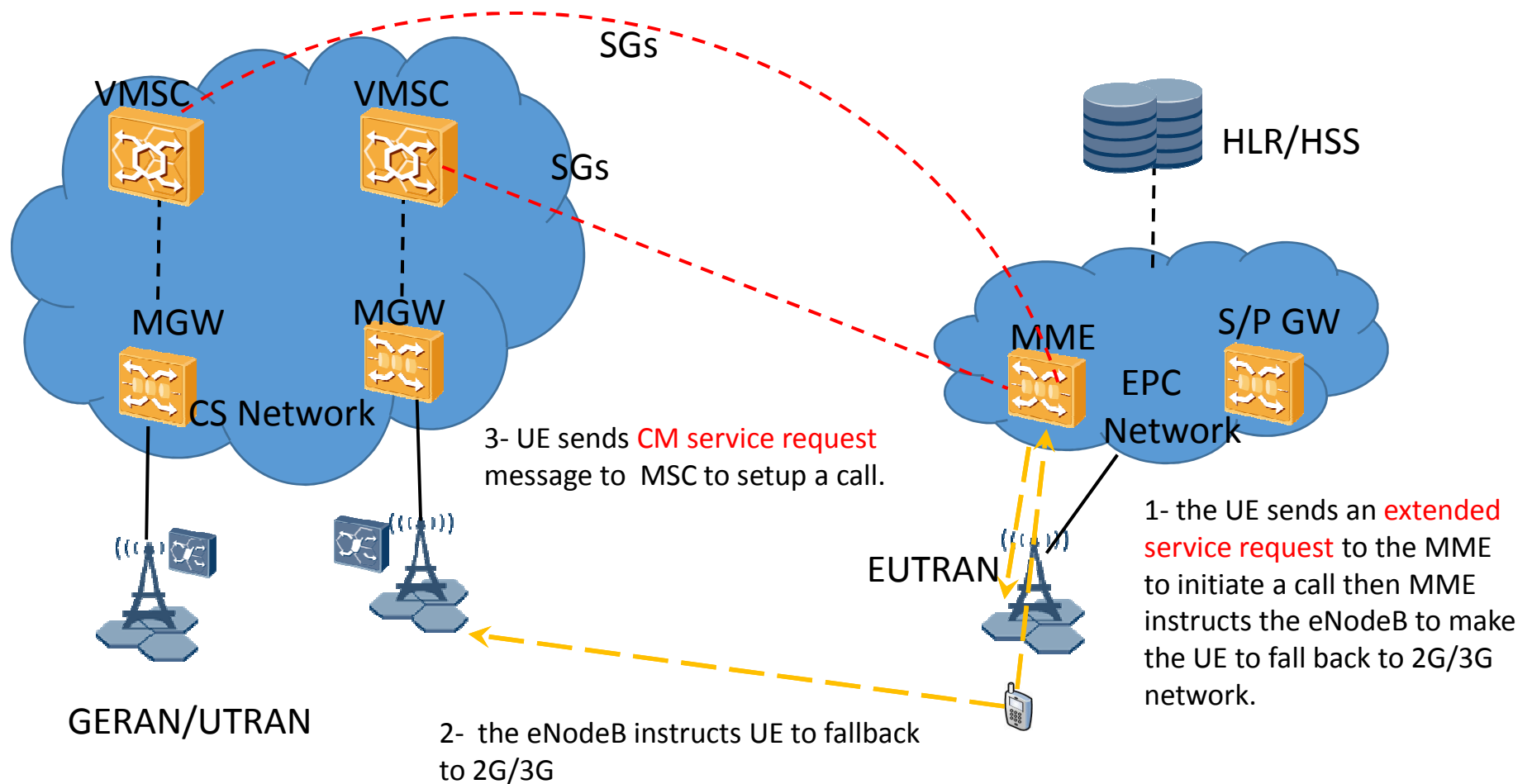
Requirements of CSFB

1. SG interface , to communicate between MME in the LTE and VMSC in 2G/3G networks.
2. Multimode single radio terminal phones.
3. USN license
4. MSC upgrade and license



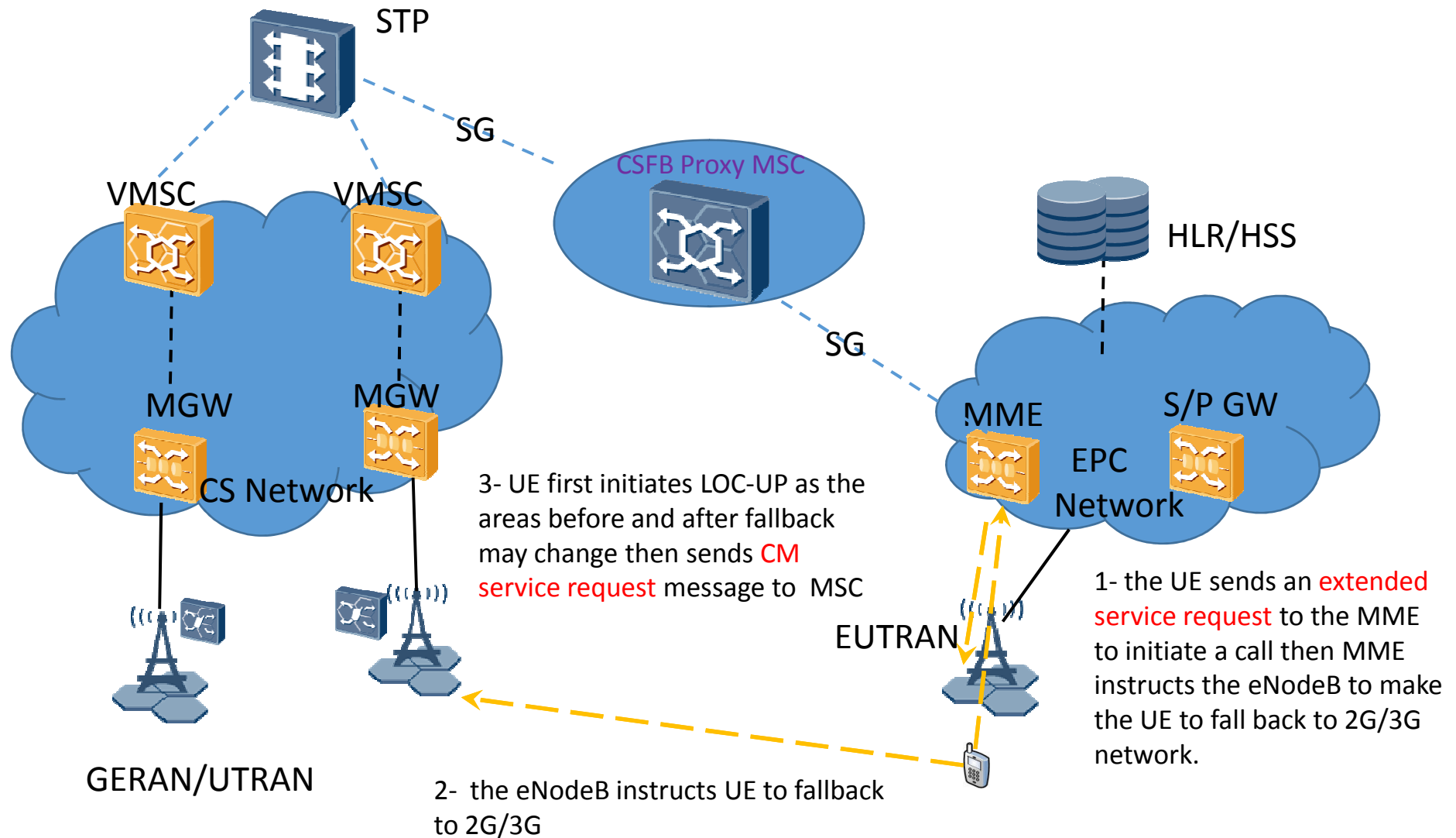
Types of CSFB Solution

1- Standard CSFB solution:

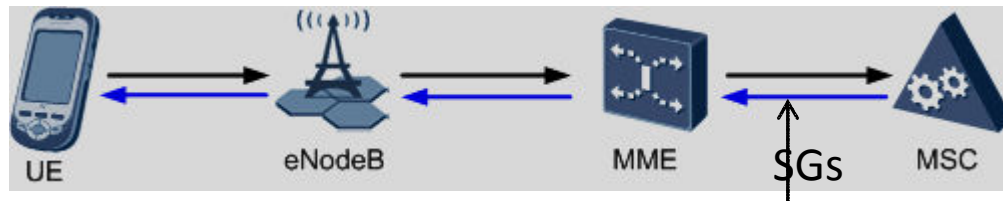


Types of CSFB Solution

2- Proxy CSFB solution:



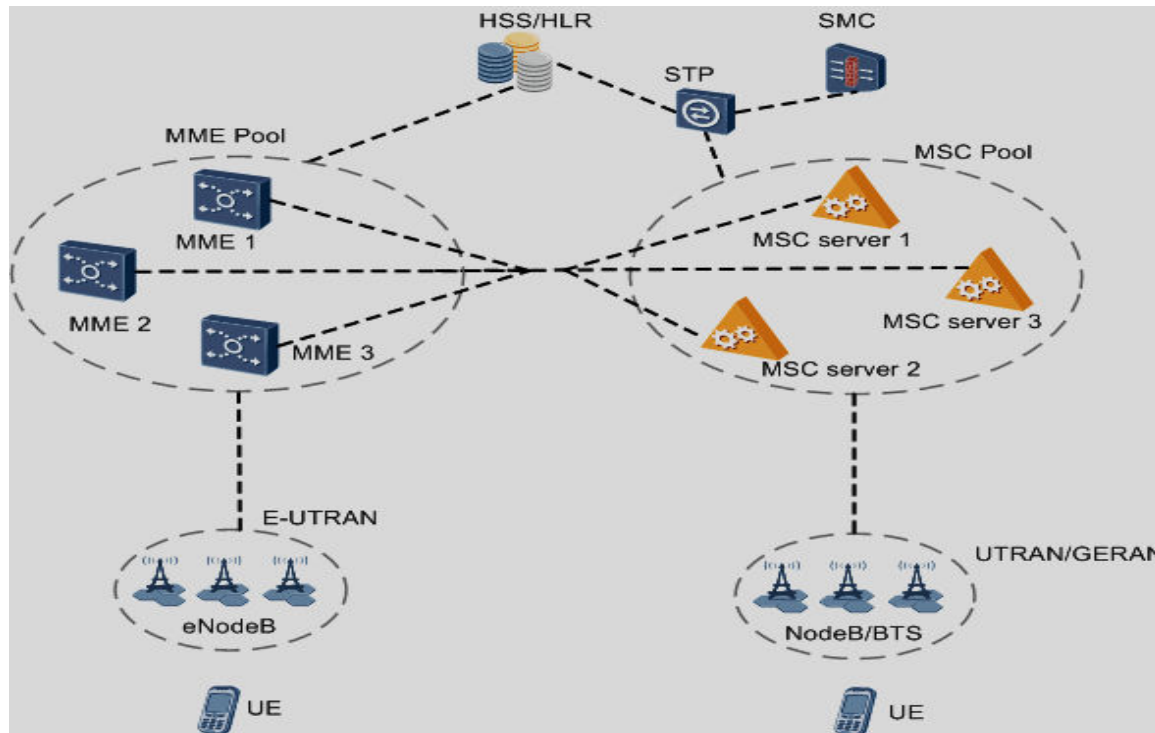
SMS Services in the CSFB



The UE doesn't need to fall back, but is transmitted transparently at the SG interface.

CSFB Redundancy

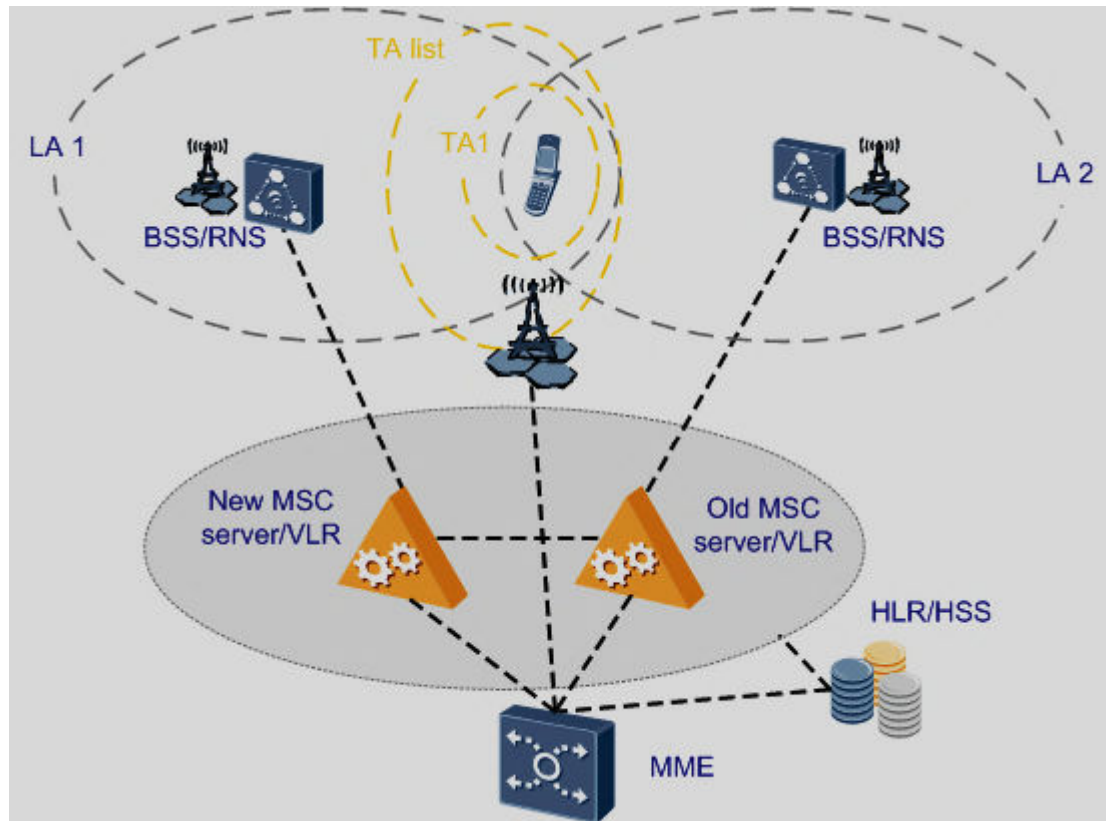
- **Back up and Recovery:** If an MME or MSC fails another MME or MSC implements fast recovery of MO and MT services



MMEs or MSCs connected in full mesh and the redundancy levels enable MO or MT to be connected successfully even if an MSC or MME down.

- **Subscriber Migration:** Whenever any MSC server fails, the MME can manually or automatically migrate subscribers to an operational MSC and If an MME fails, the eNodeB can automatically select the operational MME.

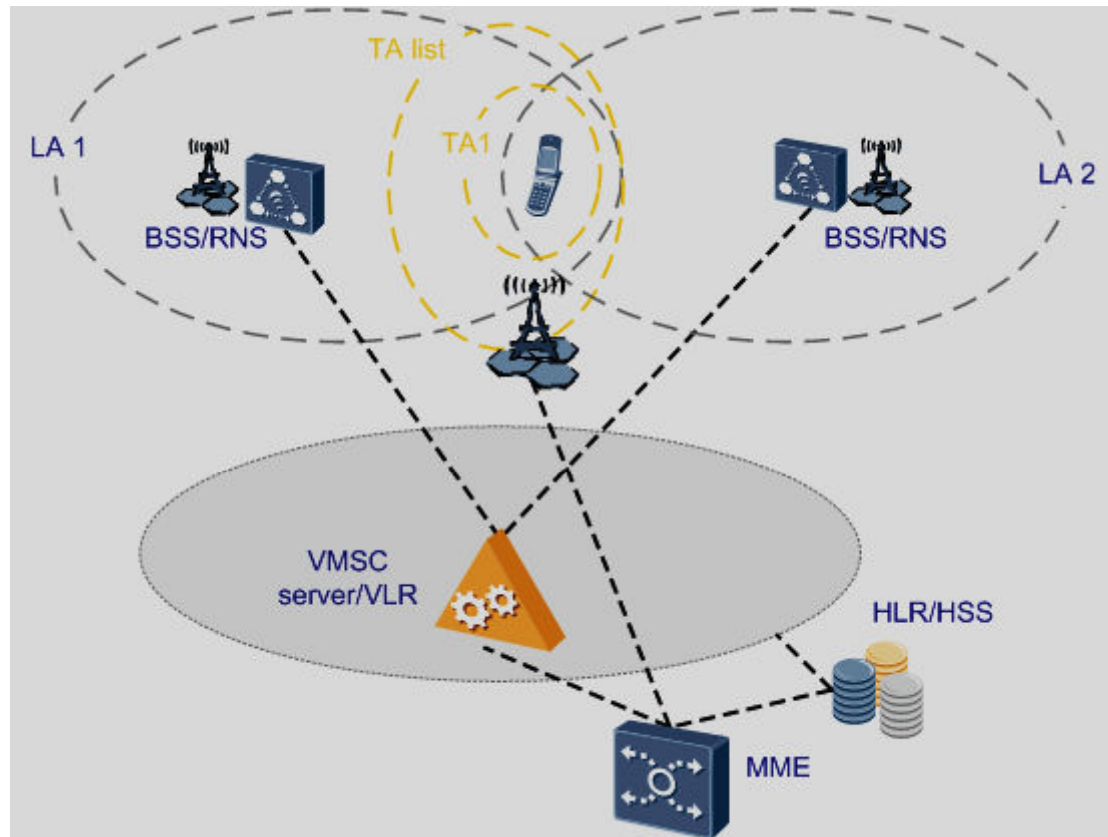
CSFB Technique MTRF(Mobile Terminating Roaming Forwarding)



A call fails when the called party roams from the old MSC coverage area to the new MSC area before the call is connected but the MTRF feature enables the original MSC server to route the call to the new MSC , thereby improving call completion rate.

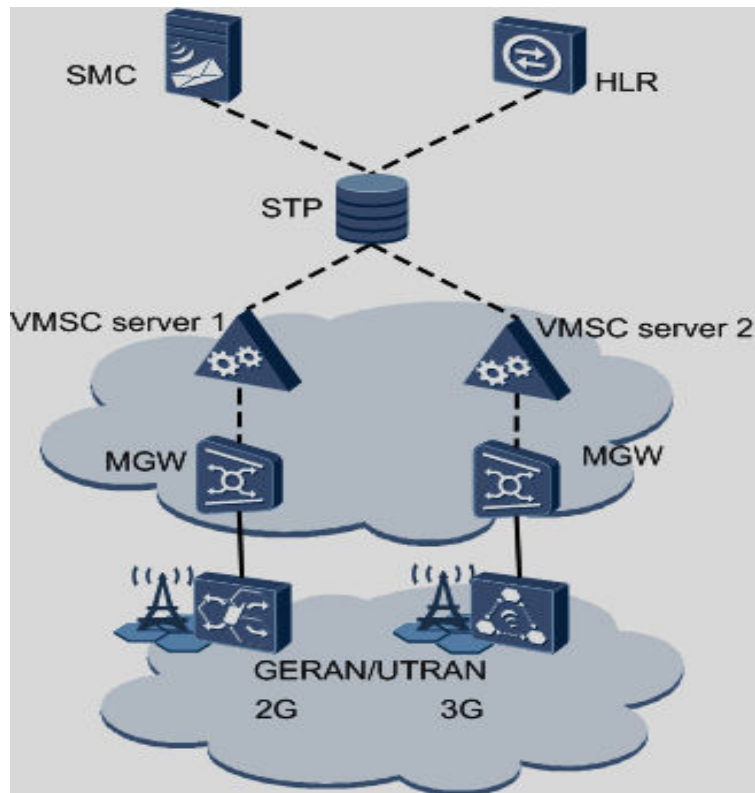
- GSM/UMTS subscribers who update locations in the border between two MSC areas before answering paging requests.
- LTE subscribers who update locations in the border between two MSC areas after falling back to the CS domain.

CSFB Technique CSMT (CS Fallback Mobile Terminating call)



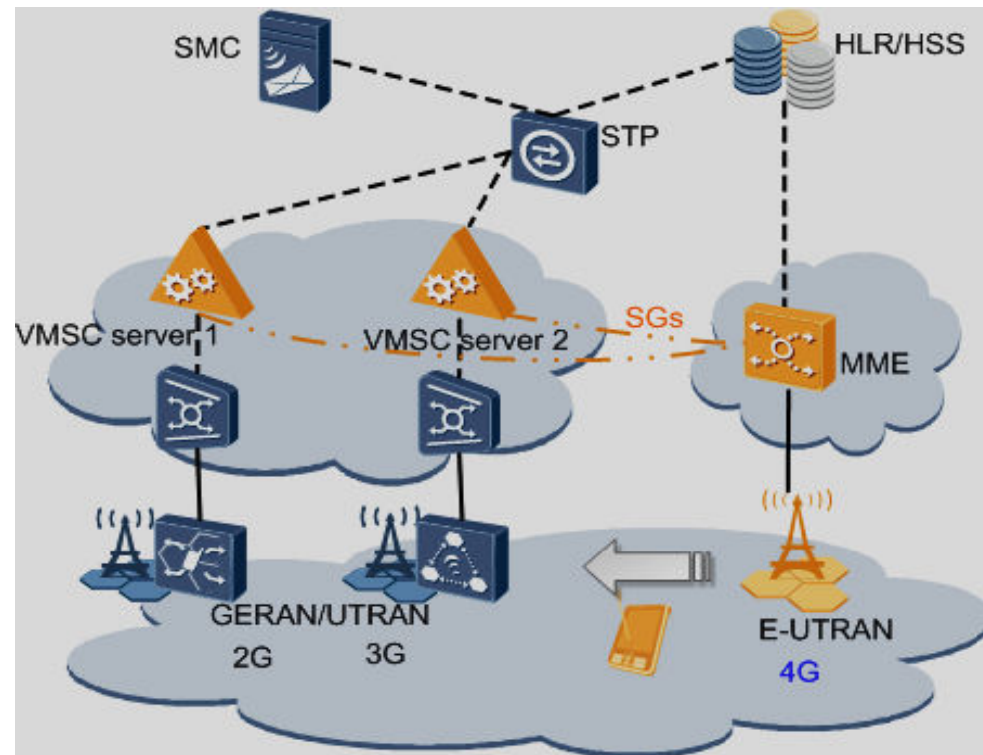
The CSMT feature enables the MSC not to connect a call until an intra-MSC location Update is complete when the intra-MSC location update request contains the CSMT flag.

Traditional Network



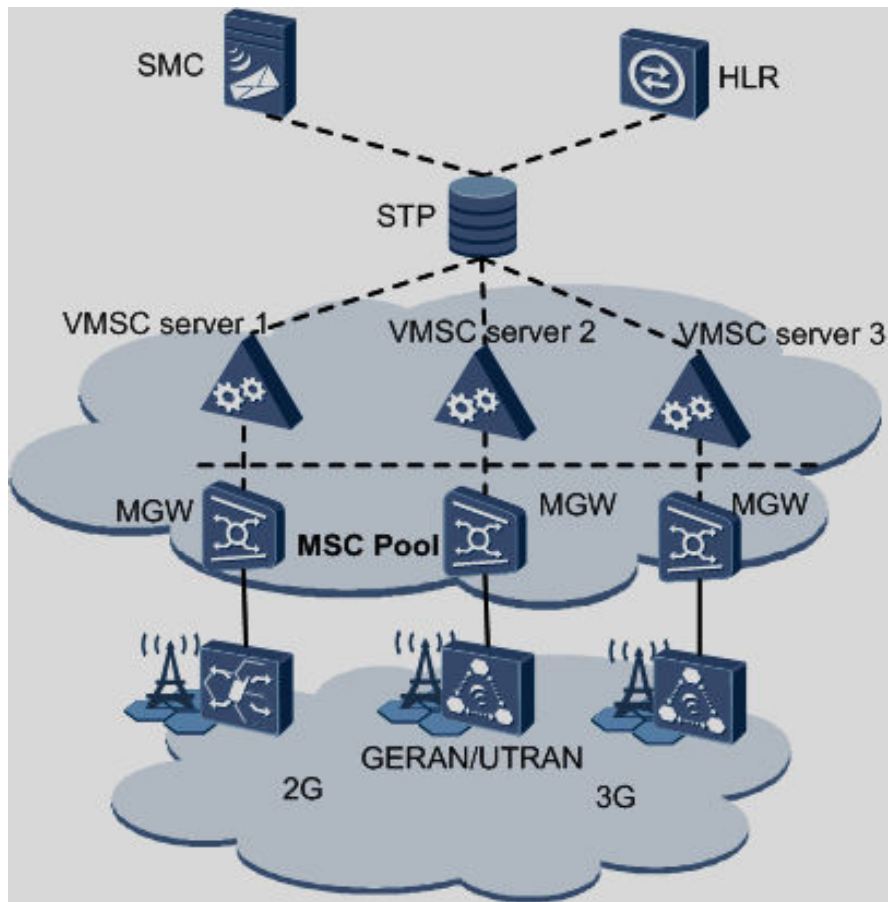
existing network on which the MSOFTX3000 functions as a (VMSC) server.

Target Network



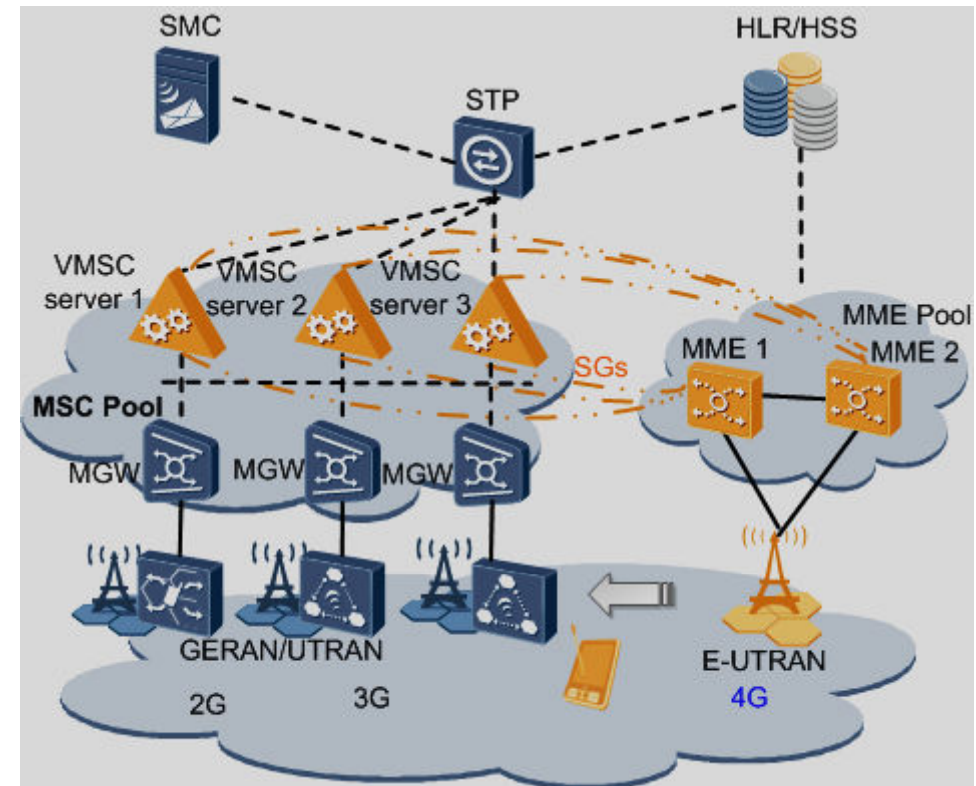
- 1- VMSC & MME servers must be upgraded to support CSFB and SG interface.
- 2- The MME selects the target mobile switching center (MSC) server by using the configured mapping between the tracking areas (TAs), location areas (LAs), and MSC servers.
- 3- TAI list boundary must not cross the LA boundary. This improves the call connection latency.
- 4- The HSS interworks with the MME over Diameter links.

Traditional Network



VMSC servers working as MSC pool

Target Network

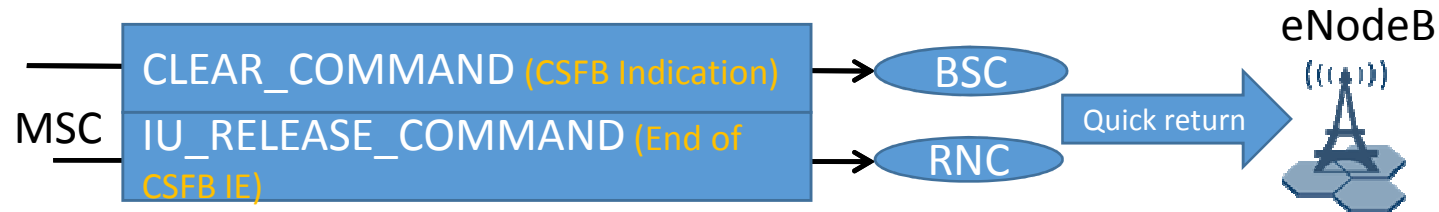


- 1- VMSC & MME servers must be upgraded to support CSFB and SG interface.
- 2- The MMEs use the IMSI Hash algorithm to select the target MSC server.

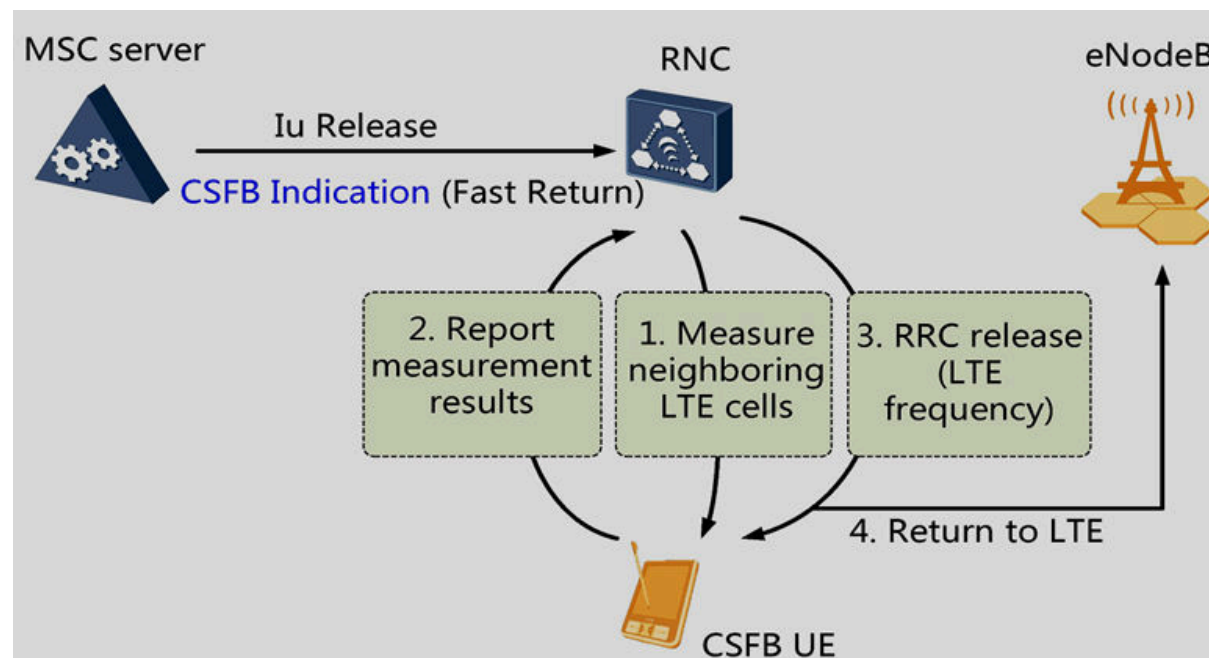
How the UE returns quickly to 4G after finishing a CSFB call

CSFB Fast return:

- PS connections are unavailable on 2G/3G:

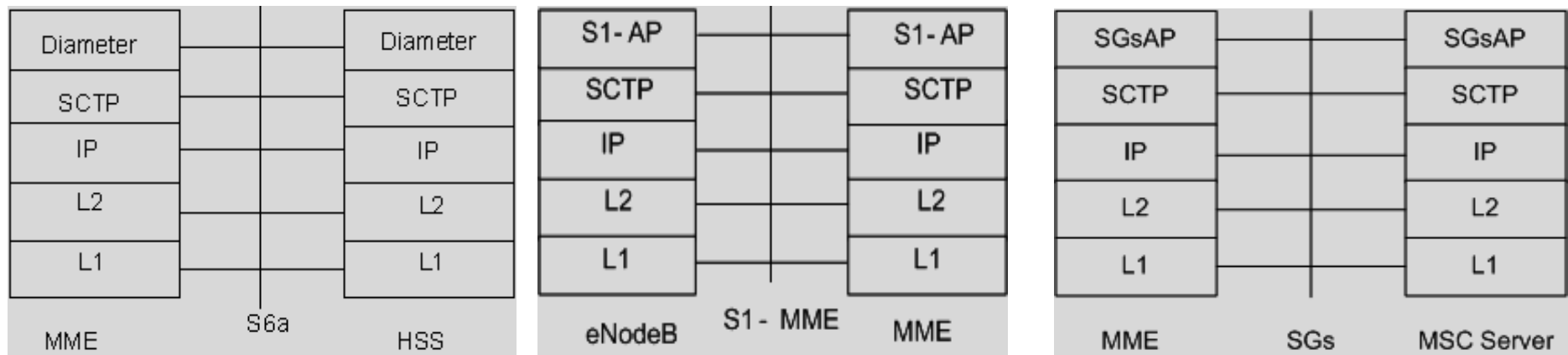


- PS connections are available on 3G: When LTE frequency detected the RNC will trigger **Redirection Flow** to the UE:



New Interfaces & Protocols

Interfaces	Protocols	Function
SGs	SGsAP	SG used for MM , Paging and SMS procedures between EPS and CS domain.
S1-MME	S1-AP	Used for signaling transmission between eNodeB and MME.
S6a	Diameter	For EPS access used for subscription and authentication data transmission between MME and Hss.



Thank You

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