**3GPP TSG-WG SA2 Meeting #165 *S2-2410925***

**Hyderabad, India, 14th Oct – 18th Oct, 2024**

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| *CR-Form-v12.2* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
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|  | **23.401** | **CR** | 3800 | **rev** | 8 | **Current version:** | **19.0.0** |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network | **X** |

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| ***Title:*** | Introduction to Split MME architecture | | | | | | | | | |
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| ***Source to WG:*** | Samsung, Sateliot, NEC, China Telecom, Intel , Xiaomi, TNO, SHARP | | | | | | | | | |
| ***Source to TSG:*** | SA2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | 5GSAT\_Ph3-ARC | | | | |  | ***Date:*** | | | 2024-10-14 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **B** |  | | | | | ***Release:*** | | | Rel-19 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-16 (Release 16) Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
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| ***Reason for change:*** | | Based on conclusions agreed in the TR 23.700-29 for KI#2 this CR proposes to introduce S&F features. This CR proposes the Annex to describe the S&F architectures using split MME option. | | | | | | | | |
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| ***Summary of change:*** | | S&F feature is implemented based on the conclusions reached for KI#2 in TR 23.700-29. | | | | | | | | |
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| ***Consequences if not approved:*** | | S&F features is not completely described. | | | | | | | | |
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| ***Clauses affected:*** | | Annex Y(new), Y.1(new), Y.2(new) | | | | | | | | |
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|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | | This CR implements clauses Y.1 and Y.2 part of Annex Y and the CR3815 implements the clause Y.3 of the same Annex. | | | | | | | | |
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| ***This CR's revision history:*** | |  | | | | | | | | |

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* Start of Changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Annex Y (informative):   
Example Models of Store and Forward Satellite operation

## Y.1 Introduction

This annex provides guidance on deployment options to support store and forward satellite operation.

## Y.2 Model A: Split MME architecture

In this architecture option (see Figure Y.2-1):

1. eNB is onboard the satellite.

2. MME is split into two functions:

a. MME-onboard: the MME part which is onboard the satellite. MME-onboard is in charge of (1) handling the S1 interface with the onboard eNB and (2) terminating the NAS protocol signalling from/to UEs via the onboard eNB.

b. MME-ground: the MME part which is on the ground network. MME-ground is in charge of handling the rest of interfaces towards other CN functions (e.g. S6a towards HSS, SGd towards SMS-GMSC/IWMSC /SMS Router, T6a towards SCEF, T6ai towards IWF-SCEF, S11 towards SGW)..



Figure Y.2-1: "Split-MME" architecture for supporting S&F satellite operation for SMS and CP CIoT services

The split-MME architecture has below principles:

1. An MME-ground is associated with at least one MME-onboard. An MME-onboard is associated with a Satellite ID identifier. The MME-ground together with the associated MME-onboard(s) behaves jointly as a single MME entity.

2. How MME-onboard(s) interacts with MME-ground and synchronization of the UE context between them is outside the scope of 3GPP in this release of specification.

3. When a UE initiates a MO procedure that needs an interaction with a core network node on the ground, the MME-onboard stores the MO procedure transaction if the feeder link is not available and synchronizes with the MME-ground when the feeder link becomes available. The MME-ground executes the procedure with the ground network nodes and syncs back the UE context with the MME-onboard when the feeder link becomes available.

4. The MO data is stored in the MME-onboard when the service link is available and the feeder link is unavailable, and transferred to the MME-ground when the feeder link then becomes available. The MT data is stored in the MME-ground when the feeder link is unavailable and transferred to the MME-onboard when the feeder link becomes available. The MME-ground determines the satellite through which to send MT data and the MT data is sent to the respective MME-onboard and stored in the MME-onboard of the satellite(s) when the feeder link is available, and transferred to the UE when service link then becomes available.

5. For MO SMS, if the feeder link is not available upon reception of the MO SMS the MME-onboard can store the MO-SMS and can immediately send the delivery report (i.e. RP-ACK) to the UE i.e. as if the MO-SMS has already been successfully delivered to the Service Centre (SC). Once the feeder link is established the MO-SMS is forwarded to the SC. Subsequently the SC sends the RP-ACK to the UE. The MME-ground can also discard the RP-ACK received from the Service Centre (SC).

6. To support UE location verification on satellite, the E-SMLC can be deployed on satellite to perform the verification of UE location functionality.

7. For the monitoring event which allows the SCS/AS to be notified of Store and Forward Satellite operation (see TS 23.682 [74] clause 5.6.1.X and 5.6.3.X) the SCS/AS communicates with HSS and MME-ground to configure and/or delete Monitoring Event.

8. Only Control Plane CIoT EPS Optimization applies in this case.

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* End of Changes \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*