**3GPP TSG-SA WG2 Meeting #162 *draft\_*S2-2405008**

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**Source: Samsung**

**Title: 23.700-29: KI#2, New Sol: Support SMS in S&F satellite operation**

**Document for: Approval**

**Agenda Item: 19.1**

**Work Item / Release: FS\_5GSAT\_ARCH\_Ph3 / Rel-19**

*Abstract of the contribution: This paper proposes solution for KI#2.*

# 1 Introduction

This contribution provides a solution to KI#2 on support of store and forward satellite operation for SMS in TR 23.700-29.

# 2 Proposal

It is proposed to approve following content in TR 23.700-29.

\* \* \* \* First change \* \* \* \*

## 6.0 Mapping of Solutions to Key Issues

Table 6.0-1: Mapping of Solutions to Key Issues

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Key Issues | | | |
| Solutions | 1 | 2 | 3 |  |
| 1 | X |  |  |  |
| 2 | X |  |  |  |
| 3 | X |  |  |  |
| 4 | X |  |  |  |
| 5 | X |  |  |  |
| 6 | X |  |  |  |
| 7 | X |  |  |  |
| 8 | X |  |  |  |
| 9 | X |  |  |  |
| 10 | X |  |  |  |
| 11 |  | X |  |  |
| 12 |  | X |  |  |
| 13 |  | X |  |  |
| 14 |  | X |  |  |
| 15 |  | X |  |  |
| 16 |  | X |  |  |
| 17 |  | X |  |  |
| 18 |  | X |  |  |
| 19 |  | X |  |  |
| 20 |  | X |  |  |
| 21 |  | X |  |  |
| 22 |  | X |  |  |
| 23 |  | X |  |  |
| 24 |  | X |  |  |
| 25 |  | X |  |  |
| 26 |  | X |  |  |
| 27 |  | X |  |  |
| 28 |  |  | X |  |
| 29 |  |  | X |  |
| 30 |  |  | X |  |
| 31 |  |  | X |  |
| 32 |  |  | X |  |
| 33 |  |  | X |  |
| 34 | X |  |  |  |
| 35 | X |  |  |  |
| 36 | X |  |  |  |
| 37 |  | X |  |  |
| 38 |  | X |  |  |
| 39 |  | X |  |  |
| 40 |  |  | X |  |
| 41 |  |  | X |  |
| 42 | X |  | X |  |
| X |  | X |  |  |

\* \* \* \* Second change (all text is new)\* \* \* \*

## 6.X Solution#X: Support SMS in S&F satellite operation

### 6.X.1 Introduction

This solution corresponds to KI#2 to enable SMS services with store and forward satellite operation.

### 6.X.2 Description

In this solution, the SMS delivery over satellite which support store and forward feature is supported based on the enhanced architecture of SMS in MME described in Annex C of TS 23.272 [18], and based on the enhanced procedures of short message transfer described in Figure 17 a) of TS 23.040 [19]. The enhanced architecture is described in Figure 6.X.2-1, and the enhanced procedure is described in Figure 6.X.3.1-1.



Figure 6.X.2-1: Architecture enhancement for SMS support in S&F satellite operation

The UE attaches to the EPS network that the E-UTRAN, MME, and the SMS-GMSC (SAT) are on-boarded to the store and forward feature supporting satellite. In the ground, the SMS-GMSC (Ground), SC, HSS are located.

It is assumed that the MME is aware of the service link connectivity and the feeder link connectivity, based on the Unavailability Period of the satellite that the MME is on-boarded. Based on the connectivity of the service link and the feeder link, the MME provides the time information to the SMS-GMSC (SAT) when to retransmit the SMS message, and when to transfer the Delivery Report of the SMS message. Subsequently, the SMS-GMSC (SAT) stores and transfers the SMS message and the Delivery Report until the time indicated by the MME is reached.

By the above mechanism, the MME can keep its responsibility of satellite link connectivity determination and retransmission time indication, and the SMS-GMSC can keep its responsibility of storing the Short Message with minimum impacts to existing mechanism for SMS.

NOTE: SMS-GMSC (SAT) and SMS-GMSC (Ground) can exchange signalling based on the implementations, and the detail is out of scope of 3GPP.

### 6.X.3 Procedures

#### 6.X.3.1 MT SMS Delivery via SMS-GMSC on satellite

Based on Figure 17a) of TS 23.040 [19], the MT SMS message is delivered as described in Figure 6.X.3.1-1 with following differences:

* The SMS-GMSC is located both in the ground and in the satellite.
* The MS SMS message and the Delivery Report of MT SMS are stored in SMS-GMSC until the service link or the feeder link becomes available.



Figure 6.X.3.1-1: Procedure for MT SMS Delivery via SMS-GMSC on satellite

The UE attaches to EPS via Regenerative satellite access, which supports store and forward operation. E-UTRAN, MME, and SMS-GSMC (SAT) are on the same satellite, and SMS-GMSC (Ground), SC, and HSS are on the ground, as described in Figure 6.X.2-1.

1. The SC initiates transfer of MT SMS. The SMS-GMSC (Ground) retrieves the address of MME or SMS-GMSC (SAT) from the HSS.
2. The SMS-GMSC (Ground) forwards the MT SMS message to SMS-GMSC (SAT).
3. The SMS-GMSC (SAT) forwards the MT SMS message to the MME, and indicates it is capable to retransmit the Short Message until a maximum retransmission time.
4. The MME checks whether the service link is connected.

**Case A: Service link is not available**

1. If the service link between the UE and the satellite is not connected as determined in step 4, then the MME sends a Delivery Report with a cause indicating that it is temporarily unreachable and with an indication requesting the SMS-GMSC (SAT) to retransmit the Short Message at a later requested retransmission time prior to the maximum retransmission time. The MME determines the requested retransmission time based on the Unavailability Period of the satellite that MME is on-boarded.
2. The SMS-GMSC (SAT) stores the MT SMS message until the requested retransmission time received from the MME.

**Case B: Service link is available**

1. If the service link is connected as determined in step 4 and/or the requested retransmission time received in step 5 is reached, the SMS-GMSC (SAT) retransmits the MT SMS message to the MME.
2. The MME pages the UE. If the UE is in the ECM-IDLE state, the UE triggers Service Request procedure upon reception of paging message from MME.
3. The MT SMS message is delivered to the UE.
4. The MT SMS message is transferred to the UE, and the Delivery Report of MT SMS is returned to the MME.
5. The MME checks whether the feeder link is connected.

**Case C: Feeder link is not available.**

1. If the feeder link between the MME and the SMS-GMSC (SAT) is not connected as determined in step 11, then the MME transfers the Delivery Report of MT SMS to the SMS-GMSC (SAT) with an information about the available time for feeder link.
2. The SMS-GMSC (SAT) stores the Delivery Report of MT SMS until the available time for feeder link indicated by the MME.

**Case D: Feeder link is available.**

1. If the feeder link is connected as determined in step 11 and the indicated available time for feeder link is reached, the SMS-GMSC (SAT) returns the Delivery Report of MT SMS message to the SMS-GMSC (Ground), and it is transferred to the SC.

### 6.X.3 Impacts on Existing Nodes and Functionality

The following impacts are foreseen by this solution:

**MME:**

- The MME checks the service link connectivity, and determines and provides the requested retransmission time to SMS-GMSC (SAT).

- The MME checks the feeder link connectivity, and determines and provides the available time for feeder link to SMS-GMSC (SAT).

**SMS-GMSC:**

- Upon reception of the available time for feeder link from MME, the SMS-GMSC (SAT) stores and forwards the Delivery Report of MT SMS message.

**HSS:**

- The HSS provides to SMS-GMSC (Ground) the address of the satellite on-boarded MME or the SMS-GMSC (SAT).

\* \* \* \* End of changes \* \* \* \*