**3GPP SA WG2 Meeting #170 S2-2507471**

**Gothenburg, Sweden, 25-29 August 2025**

Title: [Draft] LS on issues related to support of IMS voice over NB-IoT NTN connected to EPC

Response to: -

Release: Release 20

Work Item: FS\_5GSAT\_Ph4\_ARC

Source: SA2

To: RAN2, SA4, CT1, SA3

Cc: -

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Attachments: None

**1. Overall Description:**

Under the study item FS\_5GSAT\_Ph4\_ARC SA2 is studying the support for IMS voice over NB-IoT NTN connected to EPC. In the context of this study item SA2 is investigating solutions in TR 23.700-019 that could potentially use IP or non-IP type PDN connection for the (voice) traffic and would like to ask some questions in order to help SA2 to evaluate the alternative solutions.

When IP PDN connection is used, in order to achieve the target KPIs for support of IMS voice over NB-IoT NTN connected to EPC, it is expected that the support for Robust Header Compression (RoHC) will likely be required. RoHC is supported between UE and eNB when "user plane" DRBs are used to transport the data or between the UE and MME when "control plane CIoT" and SRBs are used to transport the data.

In order for SA2 to be able to evaluate the viability of using RoHC for support of IMS voice over NB-IoT NTN connected to EPC, SA2 has the following questions:

During the voice call, if enough consecutive packets are lost or erroneously decompressed, the compressor can find itself leave Second Order (SO) state and enter First Order (FO) state, and then if another enough consecutive packets are lost or erroneously decompressed, the compressor can find itself leave First Order state (FO) and enter the Initialization and Refresh (IR) state, causing gaps in the transmission of the voice packets.Some companies indicated in SA2 that the number of consecutive lost packets that will trigger the compressor to fall back from SO state to FO state is around 16 (e.g., when UO-0 header with 4 bits SN is used in SO state), and the number of consecutive lost packets that will trigger the compressor to fall back from FO state to IR state is around 64 (e.g., when UOR-2 header with 6 bits SN is used in FO state).

**Question 1 (To RAN2):** Does RAN2 have any observation on how many consecutive packets lost or erroneously decompressed will trigger the RoHC state fall back at the compressor when using RoHC?

**Question 2 (To RAN2):** Is it expected that SR/BSR can be used for NB-IoT NTN in order to deliver packets of different sizes in Uplink (UL) or Downlink (DL), this can happen either due to silence packets or occasionally uncompressed data packets?

In the context of using "Non-IP" PDN connection, 3GPP likely needs to define its own header reduction scheme for voice since no RoHC profile exists that can compress non-IP data. To do that it is necessary to understand which parts of RTP header, e.g., sequence number, timestamp, SSRC (Synchronization Source ID), Payload Type (PT) is essential to the receiver to be able to support IMS voice over GEO.

**Question 3 (To SA4):** What are the essential RTP header fields for the minimum information that need to be provided in RTP header for IMS voice over GEO?

More information on the RoHC related issues is described in S2-2506371 and S2-2507102 that are neither endorsed nor agreed by SA2.

Given the GEO IMS voice can apply to mobile phone, it is a reasonable demand that a UE using IMS voice over NB-IoT NTN should also simultaneously use other services, which may use user plane for transmission efficiency. SA2 has observed RAN2 has enforced the limitation that the capability a NB-IoT UE supports maximum 2 DRBs. In order for SA2 to reach a conclusion to use user plane and DRBs to support IMS voice, SA2 would like to understand whether NB-IoT AS protocols can support more than 2 DRBs (e.g. 3 DRBs) in Rel-20, then the UE can support simultaneous voice and other services even during the call.

**Question 4 (To RAN2):** Is it feasible to support more than 2 DRBs for a UE accessing NB-IoT in Rel-20?

In addition to user-plane based solutions to carry voice media, several other proposed solutions under Key Issue #1 (Support of IMS voice call over NB-IoT NTN via GEO satellite connecting to EPC) rely on control-plane-based mechanisms, where Control Plane CIoT EPS optimisation and SRBs are used to transport SIP signaling and/or voice media.

For this category of “control plane solutions”, SA2 understands that CT WG1 in rel.19 under the WI NORDAT\_CP specified a new NAS message for data transfer over NAS with a reduced NAS layer overhead of 2 bytes, NAS layer security overhead of 4 bytes for MAC (integrity protection) and 1 byte for SN (Total = 7 bytes). SA2 is evaluating whether it is possible to reduce the overhead further. Specifically SA2 has the following questions:

**Question 5** (**To SA3**): Considering that in the context of IMS voice over NB-IoT NTN connected to EPC, a specific SRB(i.e. via a dedicated EPS bearer for Data over NAS) will be used for transfer of voice media packets only, is there a concern to eliminate the 5 bytes of NAS layer security overhead?

**Question 6 (To CT1)**: In addition to question 5 related to security, is there any further possibility to reduce the NAS overhead further than what the rel.19 NORDAT\_CP WI provided?

Currently, SRBs are only supported over RLC Acknowledged Mode (AM) (TS 36.331), and the possible impacts of this are discussed in S2-2507107, which is not endorsed or agreed by SA2.

In order for SA2 to be able to evaluate between user-plane and control-plane solutions to carry voice media the use of RLC Unacknowledged Mode (UM) for SRBs, SA2 has the following question:

**Question 7 (To RAN2)**: Can RAN2 confirm whether, it is technically feasible to support and configure RLC UM for SRBs, for example: in NB-IoT deployments over GEO satellite, when SRBs are used to carry voice media?

**2. Actions:**

**To RAN2:**

**ACTION:** SA2 requests RAN2 to answer Question 1,2,4,7.

**To SA4:**

**ACTION:** SA2 requests SA4 to answer Question 3.

**To SA3:**

**ACTION:** SA2 requests SA4 to answer Question 5.

**To CT1:**

**ACTION:** SA2 requests SA4 to answer Question 6.

**3. Date of Next TSG SA WG2 Meetings:**

TSG-SA2 Meeting #171 13-17 October 2025 Wuhan, PRC

TSG-SA2 Meeting #172 17-21 November 2025 Dallas, USA